

Advant[®] OCS
with Master software

Bus Configuration Builder

Version 2.7

User's Guide

3BDS 100 312R201



Use of **DANGER**, **WARNING**, **CAUTION**, and **NOTE**

This publication includes, **DANGER**, **WARNING**, **CAUTION**, and **NOTE** information where appropriate to point out safety related or other important information.

DANGER	Hazards which could result in severe personal injury or death
WARNING	Hazards which could result in personal injury
CAUTION	Hazards which could result in equipment or property damage
NOTE	Alerts user to pertinent facts and conditions

Although **DANGER** and **WARNING** hazards are related to personal injury, and **CAUTION** hazards are associated with equipment or property damage, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all **DANGER**, **WARNING**, and **CAUTION** notices.

TRADEMARKS

ABB Master and MasterPiece are registered trademarks of ABB Asea Brown Boveri Ltd., Switzerland.

Advant and AdvaBuild are registered trademarks of ABB Asea Brown Boveri Ltd., Switzerland.

AdvaSoft, Advant Station, AdvaBuild On-line Builder, Advant Controller, and Advant Fieldbus are trademarks of ABB Asea Brown Boveri Ltd., Switzerland.

Acrobat is trademark of Adobe Systems Incorporated.

IBM and IBM PC are registered trademarks of International Business Machines Corporation.

Microsoft, MS-DOS, and Windows are registered trademarks, and Windows for Workgroups and Windows NT are trademarks of Microsoft Corporation.

NOTICE

The information in this document is subject to change without notice and should not be construed as a commitment by ABB Automation Products GmbH. ABB Automation Products GmbH assumes no responsibility for any errors that may appear in this document.

In no event shall ABB Automation Products GmbH be liable for direct, indirect, special, incidental or consequential damages of any nature or kind arising from the use of this document, nor shall ABB Automation Products GmbH be liable for incidental or consequential damages arising from use of any software or hardware described in this document.

This document and parts thereof must not be reproduced or copied without ABB Automation Products GmbH's written permission, and the contents thereof must not be imparted to a third party nor be used for any unauthorized purpose.

The software described in this document is furnished under a license and may be used, copied, or disclosed only in accordance with the terms of such license.

Copyright © ABB Automation Products GmbH 1999

TABLE OF CONTENTS

Chapter 1 - Introduction

1.1	Before You Begin	1-1
1.2	Equipment Requirements.....	1-1
1.3	How to Use This Book.....	1-2
1.4	Conventions	1-3
1.4.1	Keys	1-3
1.4.2	Commands and Menus.....	1-4
1.5	Related Documentation.....	1-4
1.6	Release History	1-5
1.7	Terminology	1-5
1.8	Product Overview	1-7
1.9	User Interface.....	1-8

Chapter 2 - Installation

Chapter 3 - Configuration/Application Building

3.1	Considerations	3-1
3.1.1	Overview of Human-Machine Interface for AC 100 Series	3-1
3.1.2	Configuration Methods	3-1
3.1.2.1	Configuration with Bus Configuration Database	3-2
3.1.2.2	Configuration with BOIL Files	3-3
3.1.2.3	Configuration with COIL Files	3-4
3.1.2.4	Dependencies of Configuration Methods	3-5
3.2	Capacity and Performance	3-5
3.3	Application Start-up.....	3-6
3.3.1	Start-up Under Windows NT	3-6
3.4	Tutorial.....	3-6
3.5	Application Procedures.....	3-7
3.5.1	Application of Bus Configuration Builder for AF100 OPC	3-7
3.5.1.1	Bus Configuration Builder - AF100 OPC, Background ..	3-7
3.5.1.2	Bus Configuration Builder - AF100 OPC, Preconditions	3-10
3.5.1.3	Start-up and Environment Selection for AF100 OPC.....	3-10
3.5.1.4	In the Bus Configuration Builder Application.....	3-11
3.5.1.5	Functions of Bus Configuration Builder for AF100 OPC	3-12
3.5.1.6	Bus Load Calculation.....	3-14
3.5.1.7	Examples of Reports	3-15
3.5.2	Workflow - Bus Configuration Builder for AF100 OPC.....	3-19
3.5.2.1	Step 1 - Prepare Input for Bus Configuration Database.	3-19

CONTENTS (continued)

3.5.2.2	Step 2 - Start Bus Configuration Builder	3-20
3.5.2.3	Step 3 - Modification of Bus Configuration Database ...	3-20
3.5.2.4	Step 4 - Check of Bus Configuration	3-21
3.5.2.5	Step 5 - Export Data to AF100 OPC	3-22
3.5.2.6	New Configuration After On-line DB Change.....	3-22
3.5.3	Application of Bus Configuration Builder for AdvSoft for Windows	3-22
3.5.3.1	Bus Configuration Builder - AdvSoft for Windows, Background	3-22
3.5.3.2	Bus Configuration Builder - AdvSoft for Windows, Preconditions	3-27
3.5.3.3	Bus Configuration Builder - AdvSoft for Windows, Proceeding	3-28
3.5.3.4	Functions of Bus Configuration Builder for AdvSoft for Windows	3-30
3.5.4	Workflow - Bus Configuration Builder for AdvSoft for Windows.....	3-33
3.5.4.1	Step 1 - Prepare Input for Bus Configuration Builder....	3-33
3.5.4.2	Step 2 - Start Bus Configuration Builder	3-34
3.5.4.3	Step 3 - Modification of Data Prepared During Step 2 ..	3-34
3.5.4.4	Step 4 - Export Data to AdvSoft for Windows.....	3-34
3.5.4.5	New Configuration After On-line DB Change.....	3-34
3.6	Configuration/Application Building Menus	3-35
3.6.1	File Menu	3-35
3.6.1.1	File New Database.....	3-35
3.6.1.2	File Delete Database.....	3-35
3.6.1.3	File Compact Database	3-35
3.6.1.4	File Save As.....	3-35
3.6.1.5	File Page Setup	3-37
3.6.1.6	File Print	3-38
3.6.1.7	File Print Setup	3-40
3.6.1.8	File Exit	3-41
3.6.2	Edit Menu.....	3-41
3.6.2.1	Edit Create Bus.....	3-41
3.6.2.2	Edit Create AF100 OPC Station	3-42
3.6.2.3	Edit Delete	3-42
3.6.2.4	Edit Copy	3-42
3.6.2.5	Edit Find	3-43
3.6.2.6	Edit Properties	3-44
3.6.3	View Menu	3-45
3.6.3.1	View Refresh	3-45

CONTENTS (continued)

3.6.3.2	View Next Pane	3-45
3.6.3.3	View Split	3-45
3.6.3.4	View Expand All	3-46
3.6.3.5	View Collapse All	3-46
3.6.4	Action Menu	3-46
3.6.4.1	Action Bus Load Calculation	3-46
3.6.4.2	Action Check Database	3-47
3.6.4.3	Action Cross Reference of DataSets	3-49
3.6.4.4	Action Cross Reference of Extended DB Elements	3-50
3.6.4.5	Action Dump Database	3-50
3.6.5	Help Menu	3-51
3.6.5.1	Help Contents	3-51
3.6.5.2	Help Release Notes	3-51
3.6.5.3	Help About BCB	3-51

Chapter 4 - Runtime Operation

4.1	Operating Overview	4-1
4.2	Runtime Tutorial	4-1
4.3	Operating Instructions	4-1
4.4	Runtime Operation Menus	4-1

Chapter 5 - Maintenance

5.1	Error Messages	5-1
-----	----------------------	-----

Appendix A - References

A.1	Directories and Files - BCB for AF100 OPC	A-1
A.1.1	Directories	A-1
A.1.2	Files	A-1
A.2	Directories and Files - BCB for AdvaSoft for Windows	A-2
A.2.1	Directories	A-3
A.2.2	Files	A-3
A.2.2.1	Files on Bus Directories	A-3
A.2.2.2	Files on Node Directories	A-4

INDEX

ILLUSTRATIONS

Figure 1-1.	Organization of Manual	1-2
Figure 3-1.	Example Configuration of an AC 100 Series System with HMI.....	3-1
Figure 3-2.	Example Configuration with BOIL Files.....	3-3
Figure 3-3.	Example Configuration with COIL Files.....	3-4
Figure 3-4.	Example of a DCS Network with Human-Machine Interface Systems.....	3-7
Figure 3-5.	System Structure View of BCB and AF100 OPC.....	3-8
Figure 3-6.	Select Environment Dialog of Bus Configuration Builder	3-11
Figure 3-7.	Structure Window of Bus Configuration Builder	3-12
Figure 3-8.	Example of Context Menu.....	3-13
Figure 3-9.	Report in Right Pane.....	3-13
Figure 3-10.	Bus Load Calculation Report, Example	3-15
Figure 3-11.	BCD Check Report, Example	3-16
Figure 3-12.	DataSet Cross Reference Report, Example	3-17
Figure 3-13.	Extended DB Element Cross Reference Report, Example	3-18
Figure 3-14.	BCD Dump Report, Example	3-19
Figure 3-15.	Example of a DCS Network with AdvaSoft for Windows	3-23
Figure 3-16.	Data Flow of Communication Data FCB-BCB-AdvaSoft	3-26
Figure 3-17.	Select Environment Dialog of Bus Configuration Builder.....	3-28
Figure 3-18.	Output Window of Bus Configuration Builder.....	3-29
Figure 3-19.	Node List of the Example Configuration.....	3-30
Figure 3-20.	Save As	3-36
Figure 3-21.	Page Setup.....	3-37
Figure 3-22.	Print.....	3-39
Figure 3-23.	Print Setup.....	3-40
Figure 3-24.	Create Bus.....	3-41
Figure 3-25.	Create AF100 OPC Station.....	3-42
Figure 3-26.	Find	3-43
Figure 3-27.	Node Properties.....	3-44
Figure 3-28.	Station Properties.....	3-44
Figure 3-29.	Bus Load Calculation, Example	3-47
Figure 3-30.	Check Database.....	3-47
Figure 3-31.	About Bus Configuration Builder.....	3-51
Figure A-1.	Example of Directories and Files of BCB for AF100 OPC.....	A-1
Figure A-2.	Example of Directories and Files of BCB for AdvaSoft for Windows	A-2
Figure A-3.	Directory Structure of Project BCB_Test	A-3

TABLES

Table 1-1.	Related Documentation	1-4
Table 1-2.	Release History	1-5
Table 3-1.	DataSet Transfer Times, Bus Length up to 2000m	3-14
Table 3-2.	DataSet Transfer Times, Bus Length up to 8500m	3-14
Table 3-3.	DataSet Transfer Times, Bus Length up to 15000m	3-14
Table 3-4.	Supported Interfaces of Advant Controller 100 Series to AdvaSoft for Windows, Part 1	3-24
Table 3-5.	Supported Interfaces of Advant Controller 100 Series to AdvaSoft for Windows, Part 2	3-24
Table 3-6.	Transfer Times for Data Sets	3-33
Table 3-7.	Print Range	3-40

Chapter 1 Introduction

1.1 Before You Begin

This guide describes the Bus Configuration Builder (BCB).

The Bus Configuration Builder is a tool for support of communication configuration for Human-Machine Interface systems such as FIX/DMACS combined with AF100 OPC or AdvaSoft for Windows.

The Bus Configuration Builder is a 32-bit application running under Windows NT.

It is a configuration software for Advant OCS running on Advant Station 100 Series Engineering Stations.

This guide describes menus and commands, and covers some interesting topics concerning Bus Configuration Builder usage but it does not teach you Advant Controller or MasterPiece system configuring. For that, attend system engineering courses offered by the local ABB representative and consult the manuals listed at the end of this chapter.

1.2 Equipment Requirements

You can use your own PC or an Advant Station 100 Series Engineering Station as a platform for running the Bus Configuration Builder.

If you want to use your own PC, check whether the hardware and software requirements as stated in the *Application Builder User's Guide* are fulfilled. Advant Station 100 Series Engineering Stations do fulfill these requirements.

1.3 How to Use This Book

This book is organized into chapters and sections as shown in Figure 1-1.

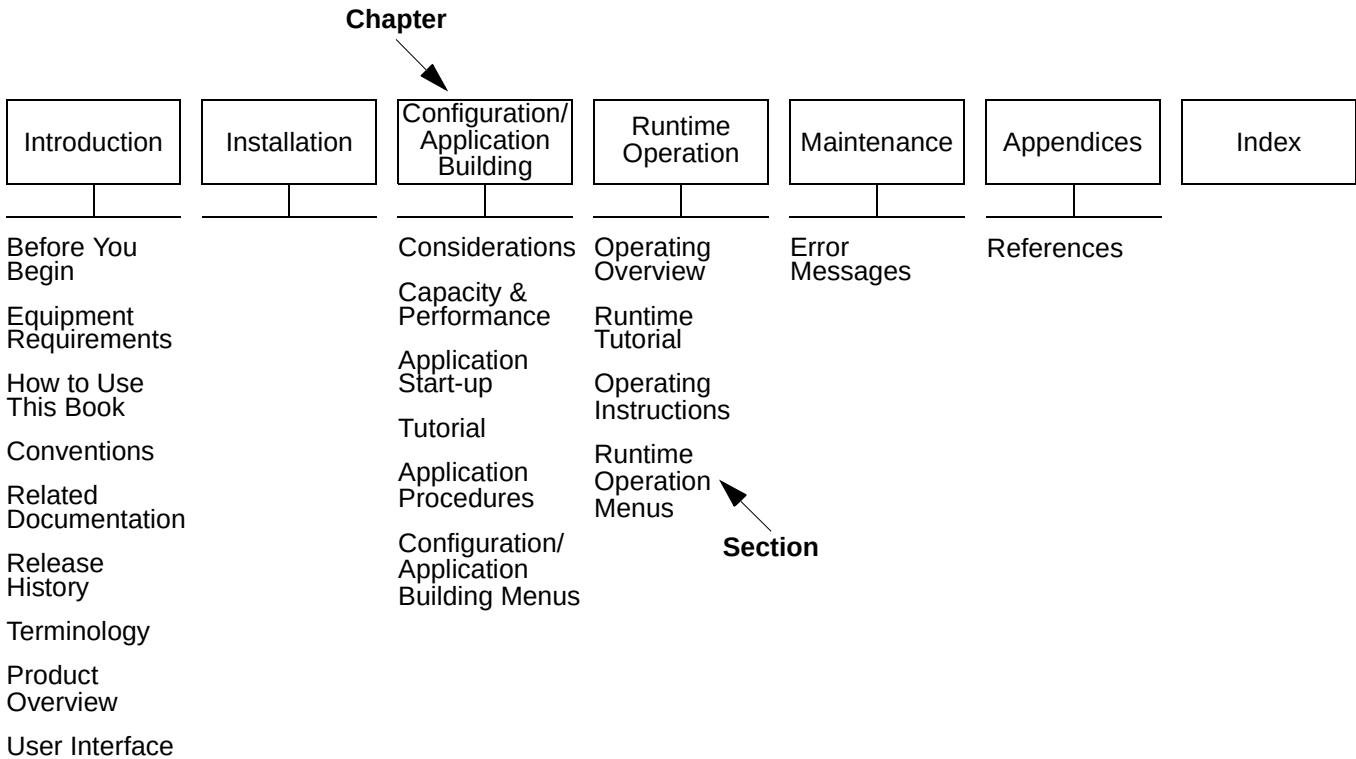


Figure 1-1. Organization of Manual

Chapter 1, Introduction

Provides you with basic information about the Bus Configuration Builder and this guide.

Chapter 2, Installation

Contains a reference how to install the Bus Configuration Builder.

Chapter 3, Configuration/Application Building

Gives you an overview of the configuration methods, introduces basic Bus Configuration Builder terms.

It tells you how to start the Bus Configuration Builder.

Gives you an overview of product operation and presents the typical workflow.

Lists the menu commands of the Bus Configuration Builder.

Chapter 4, Runtime Operation

Contains no reference.

Chapter 5, Maintenance

Contains no reference.

Appendix A, References

Describes the software directory structure of the Bus Configuration Builder, lists all files contained in and created by the Bus Configuration Builder, and describes their contents.

INDEX

The Index tells you where to find references to a variety of key topics within the text.

If you want to find references to a term or function within the text quickly, use the Index.

1.4 Conventions

Books, manuals, and so on, referenced in the text are written in *italic*.

Terms defined in Section 1.7, Terminology are in *italic*.

Filenames, directory names, acronyms appear in all capitals.

Words, which you have to type exactly in that form, are shown in **boldface** type, and if possible in CAPITAL letters, for example, **POWERSTN**.

Texts and system messages displayed on the screen are shown in **Courier** font, for example, **Select Options**.

Application windows, document windows, and dialog boxes are referenced by their names in **boldface** type, for example, **Bus Configuration Builder** window.

1.4.1 Keys

Special keyboard keys are written plain with small capitals:

- ALT, CTRL, DEL, ENTER, ESC, INS, KEYPAD 5, NUMLOCK, SCROLL LOCK, SHIFT, SPACEBAR
- BACKSPACE (for <-)
- DOWN (for down arrow, numeric keypad 2), LEFT (for left arrow, numeric keypad 4), UP (for up arrow, numeric keypad 8), RIGHT (for right arrow, numeric keypad 6)
- F1, F2, and so on (for function keys)
- MINUS (for '-' sign in numeric keypad), PLUS (for '+' sign in numeric keypad), ASTERISK (for '*' sign in numeric keypad)
- PGDOWN (for page down, numeric keypad 9), PGUP (for page up, numeric keypad 3)
- 1, 2,... (for keys in the upper row of the traditional typewriter keyboard, not in the numeric keypad)

Shorthand for combined key usage, such as holding down the CTRL key and then pressing the key L:

CTRL+L.

1.4.2 Commands and Menus

Commands are written bold with capital initial: choose **Exit** ...

Menus are written bold with capital initial:in the **File** menu ...

Shorthand for commands that you choose as items from menus, for example, command **Exit** from the **File** menu, appears as **File | Exit**.

1.5 Related Documentation

Table 1-1 lists all documentation related to the Bus Configuration Builder.

Table 1-1. Related Documentation

Category	Title	Description
Hardware	Advant Fieldbus 100 User's Guide	Describes how to install and use the Advant Fieldbus 100 network. Provides a technical description of available communication boards and modems.
Station	Advant Station 100 Series Engineering Station User's Guide	Describes the hardware and setup of Advant Station 100 Series Engineering Stations, including the Advant Station 100 Series Engineering Board.
Software	Application Builder User's Guide	Describes installation of Advant Engineering components and contains the operating instruction of Application Builder and support functions.
	Function Chart Builder User's Guide	This guide describes how Function Chart Builder can be used to configure different target systems.
	Advant OPC Server for Advant Fieldbus 100 User's Guide	This guide describes how AF100 OPC can be used for control and visualization of process signals (in conjunction with FIX/DMACS).
	AdvaSoft for Windows User's Guide	Describes AdvaSoft for Windows, its basic functions, and functions for Advainform for Window,AdvaCommand for Window, AdvaBuild for Window.
Options	Data Base Elements AC 160 Series Reference Manual	Data for all data base elements in Advant Controller 160.
	Data Base Elements AC 100 Series Reference Manual	Data for all data base elements in Advant Controller 110.
	Data Base Elements Advant Controller 70 Reference Manual	Data for all data base elements in Advant Controller 70.
	Data Base Elements Advant Controller 55 Reference Manual	Data for all data base elements in Advant Controller 55.

1.6 Release History

This is the version 3 of the Bus Configuration Builder User's Guide.
It describes Bus Configuration Builder 2.7.

Table 1-2 lists the major milestones in the development of Bus Configuration Builder.

Table 1-2. Release History

Version	Description
2.0	This is the initial Bus Configuration Builder release.
2.1	Improved release.
2.2	Unchanged release.
2.3	Unchanged release.
2.4	First release with 16-bit and 32-bit versions
2.5	The 32-bit version additionally provides Bus Configuration Database and supports AF 100 OCP. This is the last release having a 16-bit version.
2.6	Released only as 32-bit version. New commands and corresponding functions: File Save As, File Page Setup, File Print, File Print Setup, Edit Create Bus, Edit Create AF100 OPC Station, View Next Pane, View Split, View Expand All, View Collapse All, Action Check Database, Action Cross Reference of DataSets, Action Dump Database
2.7	Released only as 32-bit version. New commands and corresponding functions: Action Cross Reference of Extended DB Elements

1.7 Terminology

The following is a list of terms you should be familiar with.

Term	Description
AC 110	The abbreviation "AC 110" is used for Advant Controller 110.
AC 160	The abbreviation "AC 160" is used for Advant Controller 160.
AC 55	The abbreviation "AC 55" is used for Advant Controller 55.
AC 70	The abbreviation "AC 70" is used for Advant Controller 70.
AC 80	The abbreviation "AC 80" is used for Advant Controller 80.
Advant Controller 100 Series/AC 100 Series	The term "Advant Controller 100 Series" is used for Advant Controller X where X may have a value from 1 to 199.

Term	Description
Advant Station 100 Series Engineering Stations	The term "Advant Station 100 Series Engineering Stations" and "AS 100ES" are used for Advant Station 120 Engineering Station (AS 120ES), Advant Station 125 Engineering Station (AS 125ES), and Advant Station 130 Engineering Station (AS 130ES).
AF 100	The abbreviation "AF 100" is used for Advant Fieldbus 100.
AF100 OPC	The abbreviation "AF100 OPC" is used for AF 100 OLE Process Control, an interface between AF 100 bus and HMI system.
APB	The abbreviation "APB" is used for Application Builder.
Application Builder	The term is used for Application Builder, an Advant Engineering product component.
BCD	The abbreviation "BCD" is used for Bus Configuration Database.
BCI	The abbreviation "BCI" is used for Bus Configuration Interface.
Bus Configuration Database	The Bus Configuration Database offered by Bus Configuration Builder contains configuration data of AF 100 busses belonging to a project.
Bus Configuration Interface	Interface to Bus Configuration Database corresponding to Microsoft's Component Object Model (COM).
DB	The term "DB" is used for Advant Controller 100 Series data base. It consists of database elements (DB elements).
Extended DB Elements	DB elements with enhanced communication and HMI-support capabilities, such as AIS, DIS.
FCB	The abbreviation "FCB" is used for Function Chart Builder.
Function Chart Builder	The term is used for the Function Chart Builder, an Advant Engineering product component. It is running on Advant Station 100 Series Engineering Stations.
HMI	The abbreviation "HMI" is used for Human-Machine Interface.
Human-Machine Interface	A system interfacing human with process control system. An operator station is a typical HMI system.
Series	The term "Series" in product names is used to reference the products in general terms, without any reference to a specific model (for example, Advant Station 100 Series Engineering Stations).
XDB	The abbreviation "XDB" is used for extended DB elements

1.8 Product Overview

General

The Bus Configuration Builder is a configuration software for Advant OCS running on Advant Station 100 Series Engineering Stations. It is a 32-bit application running under Windows NT.

It supports configuration of Human-Machine Interface systems based on AF100 OPC and supports configuration of AdvaSoft for Windows for older systems. In both cases, the Advant Controller 100 Series controllers and the HMI system are nodes of a common Advant Fieldbus 100 network and the signals are transferred between AC 100 Series nodes and the HMI system by AF 100 busses.

The approach of AF100 OPC and AdvaSoft for Windows is different. So, the projecting methods and the Bus Configurations Builder functions for these two approaches are also different.

See also in Section 3.1, Considerations.

Bus Configuration Functions (Common)

At generation of target code for Advant Controller 100 Series nodes and at generation of bus configuration data for Advant Controller 400 Series nodes, the Function Chart Builder prepares information about the DB elements realizing data transfer on Advant Fieldbus 100 busses. This information is collected in the Bus Configuration Database for all nodes in a project.

In the Bus Configuration Builder the following bus configuration functions are available:

- Creation, modification, and deletion of Bus Configuration Database
- Generation of reports from the Bus Configuration Database, such as full and partial dump, data base check, and cross reference of DataSets and extended DB elements
- Calculation of bus load.

Functions for AF100 OPC

AF100 OPC evaluates the data base and plays the role of a server allowing access to Advant Controller 100 Series nodes on Advant Fieldbus 100 for Human-Machine Interface system clients.

The Bus Configuration Builder offers configuration of AF100 OPC nodes in Bus Configuration Database for bus configuration check and more precise calculation of bus load.

NOTE

Bus Configuration Database and functions for AF100 OPC are offered only by 32-bit versions of Bus Configuration Builder running under Windows NT. These functions were not available for Bus Configuration Builder release 2.4 and earlier.

Functions for AdvaSoft for Windows 1.3

In case of AdvaSoft for Windows 1.3 the use of Bus Configuration Builder is not necessary because AdvaSoft for Windows 1.3 collects the necessary data directly from the data structure

supported by Function Chart Builder. For compatibility reasons the working method with Bus Configuration Builder is additionally supported with the same functionality as in AdvaBuild for Windows 1.2.

NOTE

Extended DB elements have been introduced with AdvaBuild for Windows 1.3. AdvaSoft for Windows 1.3 collects also in this case the necessary data directly from the data structure handled by Function Chart Builder and no support is necessary by the Bus Configuration Builder 2.3.

Functions for AdvaSoft for Windows 1.0, 1.1, and 1.2

The Bus Configuration Builder collects information from the target code generated for AC 100 Series belonging to a project and connected to AF 100, then makes this information available in form of COIL*.* files for configuration of AdvaSoft for Windows nodes. When programming AdvaSoft for Windows nodes, you evaluate the COIL*.* files and create DB elements, which access signals of the AC 100 Series nodes along AF 100 for HMI system clients.

The following Bus Configuration Builder functions are available:

- Configuration of the data exchange between a certain AdvaSoft node and all AC 100 Series nodes connected to AF 100.
- Generation of summary descriptions from the collected object descriptions. These descriptions can be used by AdvaSoft for Windows for automatic configuration of the access path to these objects. Additionally, the Bus Configuration Builder generates source code for DataSet communication elements. It can be used for user specific configuration of AdvaSoft for Windows.

1.9 User Interface

The Bus Configuration Builder is a Windows application program with typical graphic user interface and look-and-feel of Windows programs. It presents an application window, offers menus and dialog boxes. You choose the commands by accelerator keys and shortcuts on the keyboard or by mouse actions.

See detailed information on the graphic user interface and on interacting with Windows programs in the user's guide of Windows installed on your AS 100ES or PC, for example,

Basics and Installation Microsoft Windows NT Workstation Version 4.0, Microsoft Corporation, Document No. 94945-0996 and Microsoft Windows Operating System 3.1 User's Manual, Microsoft Corporation, Document No. W154345-0993, respectively.

Or select **Help** from the **Start** menu of Windows NT and then look for relevant topics in Windows NT Help, or—in case of Windows for Workgroups—select the **Windows Tutorial** item from the **Help** menu of the Windows Program Manager.

Chapter 2 Installation

See *Bus Configuration Builder Release Notes*.

Chapter 3 Configuration/Application Building

3.1 Considerations

3.1.1 Overview of Human-Machine Interface for AC 100 Series

The Human-Machine Interface (HMI) for Advant Controller 100 Series is running on an engineering station or PC and communicates with the HMI via AF 100.

Possible HMI systems are the following:

- AF 100OPC + FIX/DMACS (the Windows NT version of AdvaSoft for Windows)
- AdvaSoft for Windows (including FIX/DMACS)
- AS160 OS, a version of AdvaSoft for Windows trimmed to ABB PPC's special needs.

Figure 3-1 shows a possible small configuration.

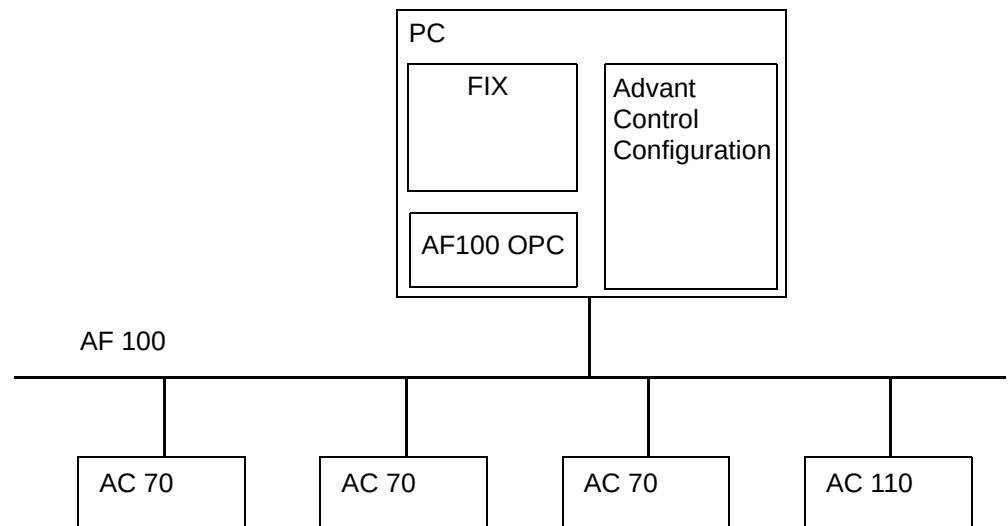


Figure 3-1. Example Configuration of an AC 100 Series System with HMI

3.1.2 Configuration Methods

The following configuration methods are used:

- Configuration with Bus Configuration Database
“BCD-method” - to be used with AF 100OPC
- Configuration with BOIL Files
“BOIL-method” - to be used with AdvaSoft for Windows 1.3.
- Configuration with COIL Files
“COIL-method” - to be used with AdvaSoft for Windows 1.0, 1.1, and 1.2

3.1.2.1 Configuration with Bus Configuration Database

Function Chart Builder Phase

In the Function Chart Builder you edit your application and instantiate DB elements DSP, DAT, EVS, AIC, DIC, all extended DB elements (XDBs), CI, and PM as applicable.

The extended DB elements handle, in fact, signals and events and have HMI-relevant properties.

For signals and events originating from other (non-extended) DB elements, instantiate DAT elements for their transport, copy the signal values by MOVE PC elements.

Element libraries of some node types offer DAT_AI, DAT_AO, DAT_DAT, DAT_DI, and DAT_DO elements carrying HMI-relevant properties of signals. In this case, you can instantiate additionally DAT_* elements fitting to the DAT instances transporting the signal values. These DAT_* instances appear both in the ODB of Function Chart Builder and in the Bus Configuration Database.

Alternatively, you can create DAT_* elements for DATs transporting the signal values also automatically. The automatically created DAT_* instances appear only in the Bus Configuration Database.

Anyway, you assign the signal names to be displayed on the screen of the operator station, already in this early phase using the Function Chart Builder.

At the generation of target code for AC 100 Series nodes, the Function Chart Builder prepares information about the DB elements realizing data transfer on AF 100 busses. This happens also at on-line changes.

At the generation of BCD data generation for AC 400 Series nodes, the Function Chart Builder prepares information about the DB elements realizing data transfer on AF 100 busses.

Bus Configuration Builder Phase

The Bus Configuration Database contains this information about a whole project. With different menu commands of the Bus Configuration Builder, you add further busses and AF100 OPC stations to the Bus Configuration Database, configure them, check the Bus Configuration Database, generate reports, and calculate bus load.

NOTES

In case of AC 400 Series, S800 I/O is realized partly in the PC section. The PC part is not reflected in the Bus Configuration Database, hence not checked by the Bus Configuration Builder and not reflected in the calculated bus load.

AF100 OPC stations are handled by Bus Configuration Builder and represented in BCD. You need not to edit any "AF100 OPC nodes" with the Function Chart Builder. So, no such node types are offered with the libraries of Advant Control Configuration 1.6 any more.

HMI Phase

AF100 OPC evaluates the data base and plays the role of a server allowing access—by means of names defined in the Function Chart Builder phase—to AC 100 Series nodes on AF 100 for Human-Machine Interface system clients.

In AF100 OPC and in the client HMI systems, you do not need to assign signal names to the signals contained in Bus Configuration Database.

NOTES

This method is available only in conjunction with 32-bit Bus Configuration Builder versions beginning from release 2.5. The DAT_* elements are available in AMPL Element Libraries beginning from release 1.1. The automatic DAT_* generation is available with Function Chart Builder beginning from release 4.6.

The Bus Configuration Builder is also useful without having the need to configure AF100 OPC. Bus Configuration Builder can be used for checks and calculation of bus load.

3.1.2.2 Configuration with BOIL Files

Function Chart Builder Phase

In the Function Chart Builder you edit your application and instantiate DB elements DSP, DAT, EVS, AIC, DIC, all extended DB elements (XDBs), CI, and PM as applicable.

The extended DB elements handle signals and events and have HMI-relevant properties. For signals and events originating from the other (non-extended) DB elements, instantiate DAT elements for their transport, copy the signal values by MOVE PC elements.

In this early phase, you can define HMI-relevant values, such as signal names to be displayed on the screen of the operator station, only for the extended DB elements in the application.

At the generation of target code for AC 100 Series nodes, the Function Chart Builder prepares information about the DB elements realizing data transfer on AF 100 busses in the file BOILnnnn.C00. This is a TAB separated ANSI file.

Bus Configuration Builder Phase

Execute the Bus Configuration Builder (for AdvaSoft for Windows [version 3.11]) for checks and calculation of bus load.

HMI Phase

AdvaSoft for Windows version 1.3 reads and evaluates BOILnnnn.C00.

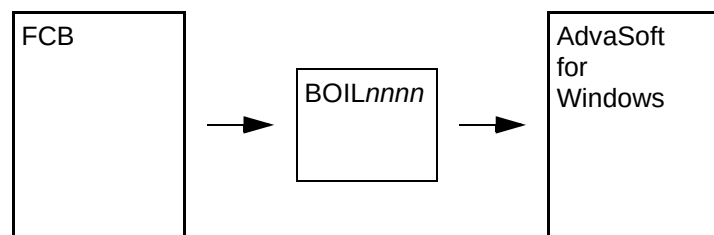


Figure 3-2. Example Configuration with BOIL Files

3.1.2.3 Configuration with COIL Files

Function Chart Builder Phase

In the Function Chart Builder you edit your application. You instantiate DB elements DSP, DAT, EVS, and PM as applicable for transfer of values and events to the HMI system. Copy the signal values by MOVE PC elements to them.

In this early phase, you cannot define HMI-relevant values, such as signal names to be displayed on the screen of the operator station, in the application.

At the generation of target code for AC 100 Series nodes, the Function Chart Builder prepares information about the DB elements realizing data transfer on AF 100 busses in the file COILnnnn.C00. This is a column oriented ANSI file.

Bus Configuration Builder Phase

The Bus Configuration Builder (for AdvaSoft for Windows [version 3.11]) collects all COILnnnn.C00 files for each bus and generates summary files for AdvaSoft for Windows.

HMI Phase

You can read and evaluate the summary files and program AdvaSoft for Windows—by hand—accordingly.

NOTES

This method is available also for all earlier Bus Configuration Builder versions.

The Bus Configuration Builder is also useful without having the need to configure AdvaSoft for Windows. In that case, you use it for checks and calculation of bus load.

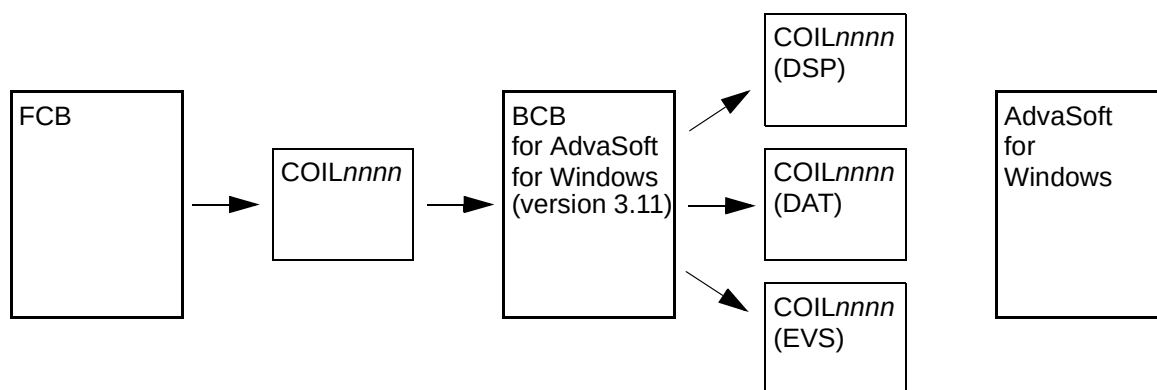


Figure 3-3. Example Configuration with COIL Files

3.1.2.4 Dependencies of Configuration Methods

The configuration of an OPC system depends on the support of the following items:

- Available DB elements in the controller
 - Low level communication elements DSP, DAT, EVS, DIC, AIC are supported by all LES controllers.
 - Extended DB elements (XDBs) AIS, AOS, DIS, DOS, MB, MI, MIL, MR are supported by AC 110 >= 2.1, AC 160 *.*.
 - HMI DB elements DAT_AI, DAT_AO, DAT_DAT, DAT_DI, and DAT_DO are supported by AC 110 *.* , AC 160 >= 1.1, AC 70 >= 1.0, AC 80 >= 1.1.
- Available methods in the tool
 - BCD-method is supported by FCB >= 4.5 (NT version only)
 - BOIL-method is supported by FCB >= 4.3.
 - COIL-method is supported by FCB >= 4.0.
- Supported methods in HMI
 - BCD-method for all elements is supported by AF100 OPC *.*.
 - COIL-method, for low level communication elements is supported by AdvaSoft for Windows *.*.
 - BOIL-method, for extended DB elements is supported by AdvaSoft for Windows 1.3.
- Multiple CPU support is offered only by the BCD-method.
- Multiple AF 100 support (for one station) is offered by the BCD-method and the BOIL-method.

3.2 Capacity and Performance

Not applicable.

3.3 Application Start-up

3.3.1 Start-up Under Windows NT

You start the Bus Configuration Builder in one of the following ways:

- Start from within the Application Builder by choosing the **Tools | Bus Configuration Builder** menu command, or by clicking on the corresponding toolbar icon.

The Application Builder opens the **Select Environment** dialog. Here you define whether

- You work with the Bus Configuration Builder, that is, using the BCD-method (see Section 3.1.2, Configuration Methods) or
- You work with the Bus Configuration Builder for AdvSoft for Windows (version 3.11), that is, using the COIL-method.

In the second case you select also the number of AF 100 bus, for which you want to configure, and whether you allow renumbering of item designations.

The Bus Configuration Builder starts to work corresponding to the selected environment (method) on the selected project and—if applicable—related to the selected bus.

- Start from the **Start** menu of Windows NT:

Start | Advant | Engineering | Bus Configuration Builder 2.7-*

The Bus Configuration Builder starts to work corresponding to the environment (method) how it was recently started and on the project and—if applicable—related to the bus it recently worked on.

3.4 Tutorial

Not applicable.

Consult Section 3.5.2, Workflow - Bus Configuration Builder for AF100 OPC and Section 3.5.4, Workflow - Bus Configuration Builder for AdvSoft for Windows.

3.5 Application Procedures

3.5.1 Application of Bus Configuration Builder for AF100 OPC

3.5.1.1 Bus Configuration Builder - AF100 OPC, Background

Environment

As an example of Bus Configuration Builder serving for Human-Machine Interface in conjunction with AF100 OPC, a possible network configuration is shown in Figure 3-4.

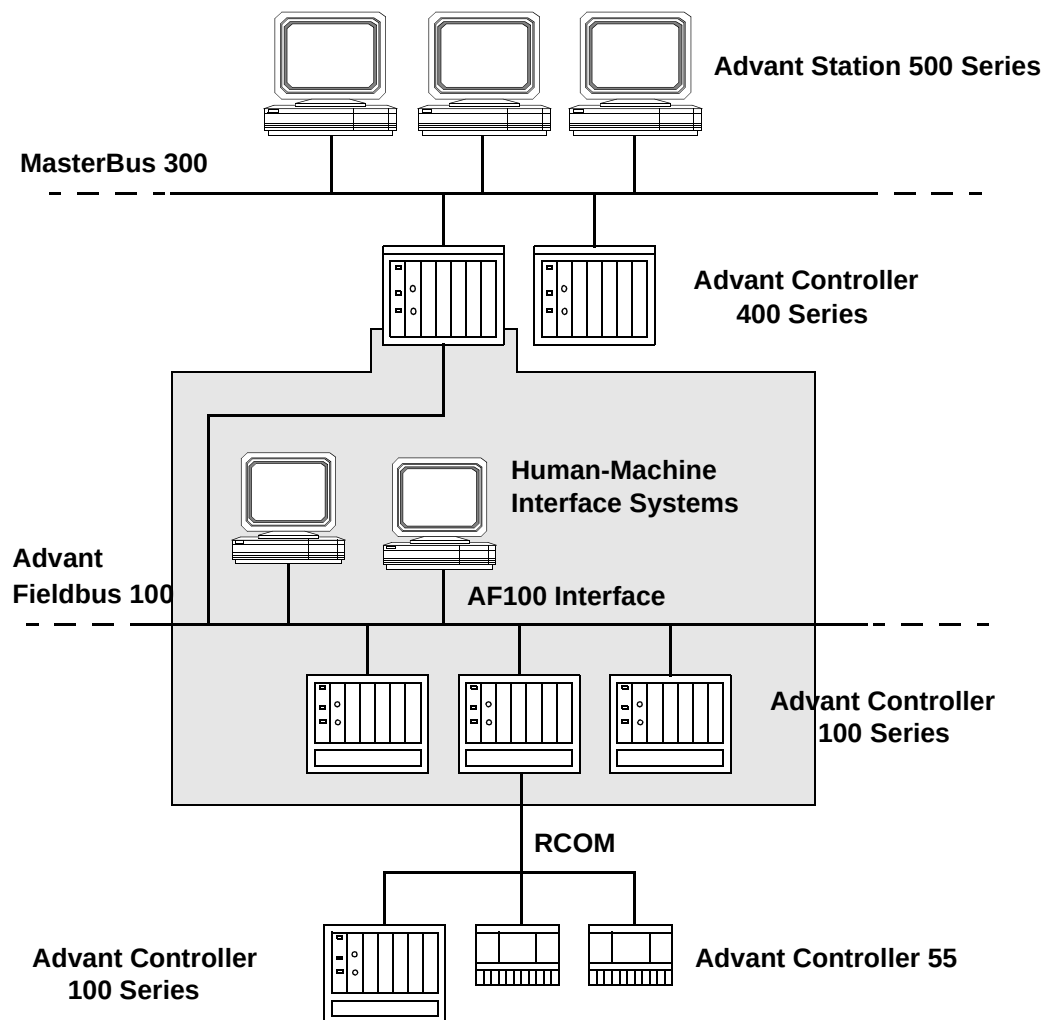


Figure 3-4. Example of a DCS Network with Human-Machine Interface Systems

The Bus Configuration Builder supports the shaded area.

The Bus Configuration Builder is a tool logically placed between Function Chart Builder and Human-Machine Interface systems. The Function Chart Builder delivers the communication data configured for the Advant Controller 100 Series (and Advant Controller 400 Series) nodes of a project with their Advant Fieldbus 100 busses and the Bus Configuration Builder stores this information in a Bus Configuration Database (BCD) and makes it available via AF100 OPC.

Internal System Structure

The internal system structure view (Figure 3-5) of the shaded area reveals the role and interfaces of the Bus Configuration Builder and its parts.

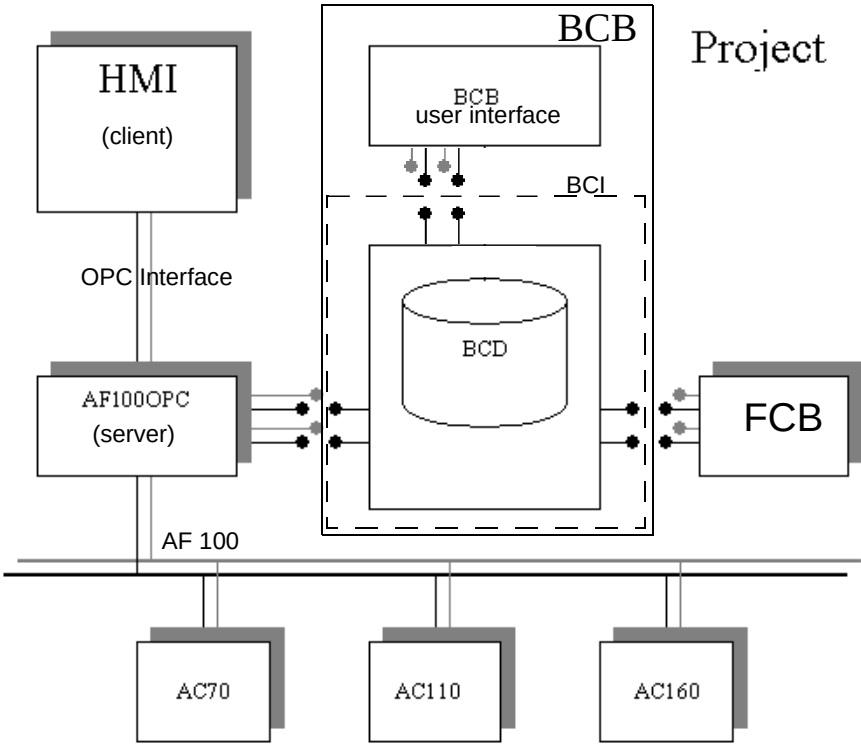


Figure 3-5. System Structure View of BCB and AF100 OPC

The Bus Configuration Builder organizes the Bus Configuration Database BCD. The Function Chart Builder can write the configuration data. AF100 OPC can read the configuration data and make signals of Advant Controller 100 Series nodes available for Human-Machine Interface systems.

You normally use the BCD-method for current AC 70, AC 80, AC 110, and AC 160 systems.

The Bus Configuration Interface

The Bus Configuration Interface (BCI) is an internal interface between AMPL Control Configuration components and AF100 OPC.

It allows access to all relevant information in the BCD:

- Busses
- Stations
- Couplers (CI DB elements)
- Processor modules
- DPSs
- EVs
- General I/O modules
- Attributes.

The BCI is implemented according to the Microsoft COM software interface specification.

NOTES

The more complex recent members of AC 100 Series can be connected to more than one AF 100, that is, they represent nodes on several busses. On the other hand, for example, AC 160 may contain more than one processor module and these processor modules share the same bus couplers. In these cases, you have to distinguish between the notions “node seen by APB and FCB” and “node of a bus”. The Bus Configuration Builder processes data of the former and creates data for the latter.

BCI offers the information corresponding to BOIL files of all busses of a project.

Communication Flow

The Bus Configuration Builder creates a Bus Configuration Database for the new project.

When the Function Chart Builder prepares target code (or BCD data) for any station connected to a Advant Fieldbus 100, it fills the BCD of the corresponding project.

This happens also in on-line case during the execution of the **File | Save and Load FCB** command.

The Bus Configuration Builder offers access to the Bus Configuration Database via the Bus Configuration Interface.

On the basis of this information, for example, AF100 OPC serves the connected Human-Machine Interface system with process data of devices in the scope of the given project.

The Bus Configuration Builder may delete the Bus Configuration Database for a given project.

On Figure 3-5 you can follow the flow of communication from Function Chart Builder (FCB) to Bus Configuration Builder (BCB) and from there to AF100 OPC and to Human-Machine Interface systems.

NOTE

AF100 OPC as OPC server can be used not only with HMI systems but also with any other OPC client.

3.5.1.2 Bus Configuration Builder - AF100 OPC, Preconditions

The following general preconditions must be fulfilled before you start the Bus Configuration Builder (serving for Human-Machine Interface in conjunction with AF 100 OPC):

1. The involved Advant Controller 100 Series nodes must be supported by Bus Configuration Builder.
2. The bus number or the selected bus number, as applicable, of any node must be in the range from 0 to 255.
3. In case of AC 70 1.1, AC 80 1.0, and AC 110 2.1 the correct bus and station numbers, in case of AC 160 1.0 the correct bus, station, and position numbers must be entered in Application Builder—at the latest before generating target code in Function Chart Builder.
4. For all involved AC 100 Series target code must be generated in Function Chart Builder by the **File | Generate Target Code** command to fill the Bus Configuration Database of the pertinent project.
5. For all involved AC 400 Series node BCD data must be generated in Function Chart Builder by the **File | Generate BCD Data** command to fill the Bus Configuration Database of the pertinent project.

3.5.1.3 Start-up and Environment Selection for AF100 OPC

Preparation

To run Bus Configuration Builder you need Windows NT and AMPL Control Configuration running on an AS100 ES or a PC. No additional equipment is necessary.

It is assumed that all stations on the AF 100, you want to generate communication data for, are gathered in one project of the Application Builder. Several AF 100 may belong to one project.

Start-up in Application Builder

1. Start the Application Builder and select the project for which you intend to configure the AF 100 busses.
2. Choose the **Tools | Bus Configuration Builder** menu command in the Application Builder or click on the corresponding toolbar icon.
The Bus Configuration Builder displays the **Select Environment** dialog.

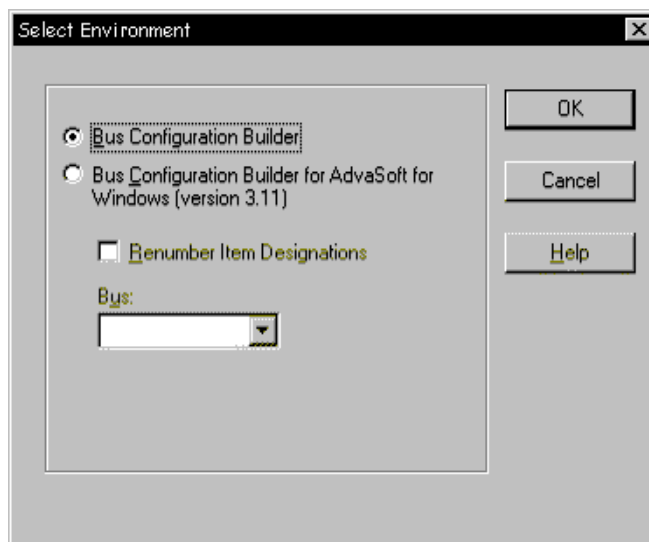


Figure 3-6. Select Environment Dialog of Bus Configuration Builder

3. You want to use the Bus Configuration Builder for AF100 OPC and use the BCD-method. Select the Bus Configuration Builder option.
4. Click **OK** to start the Bus Configuration Builder.

3.5.1.4 In the Bus Configuration Builder Application

BCB Application Window

The Bus Configuration Builder creates, opens and analyzes the available Bus Configuration Database, and presents its structure in the left pane of the BCB application window. See Figure 3-7.

The selected project covers the busses handled by Bus Configuration Builder. You find them listed under “Busses”. Several stations are addressed on each bus. Each station correspond to one or—in case of multiple CPU stations—several nodes. One node can have more than one bus connection. It represents then several bus stations.

Another aspect of a project are the nodes as handled by Function Chart Builder. You find them listed under “Nodes”.

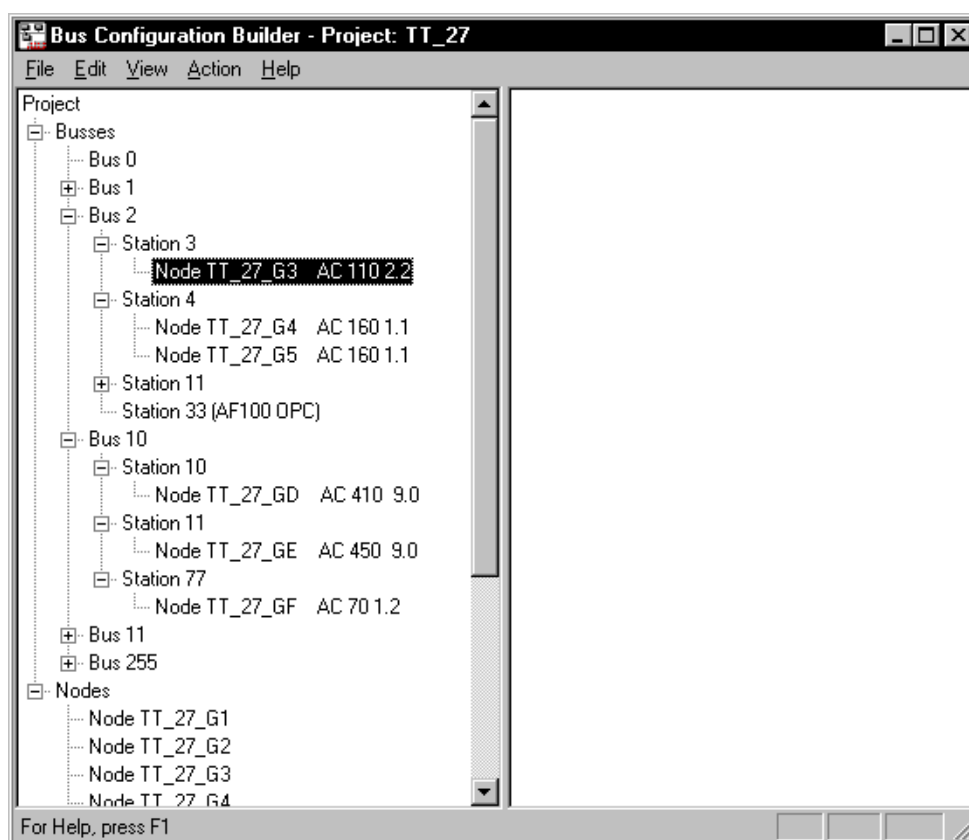


Figure 3-7. Structure Window of Bus Configuration Builder

Navigation and Selection

Commands (operations) can be performed on the whole opened Bus Configuration Database or on its selected items.

To make items visible, you can expand and collapse branches of the project by clicking on the  and  symbols, respectively. Or, you can use the LEFT and RIGHT keys instead of the mouse.

Select an item by clicking on it. Or, you can use the HOME, END, PAGE UP, PAGE DOWN, UP, and DOWN keys instead of the mouse.

3.5.1.5 Functions of Bus Configuration Builder for AF100 OPC

Menu Commands

You start the functions of the Bus Configuration Builder for AF100 OPC by choosing menu commands. They concern either the whole opened Bus Configuration Database, that is, the project you are working on, or the selected item, that is, a bus, a station, a node.

For description of commands see Section 3.6, Configuration/Application Building Menus. For command usage see Section 3.5.2, Workflow - Bus Configuration Builder for AF100 OPC.

If you click an item in application window with the right mouse button, the Bus Configuration Builder displays the context menu with most commands applicable for this item:

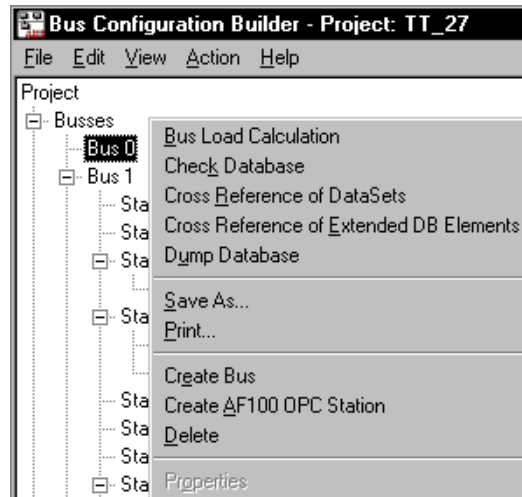


Figure 3-8. Example of Context Menu

Reports

Several commands display reports in the right pane of the application window:

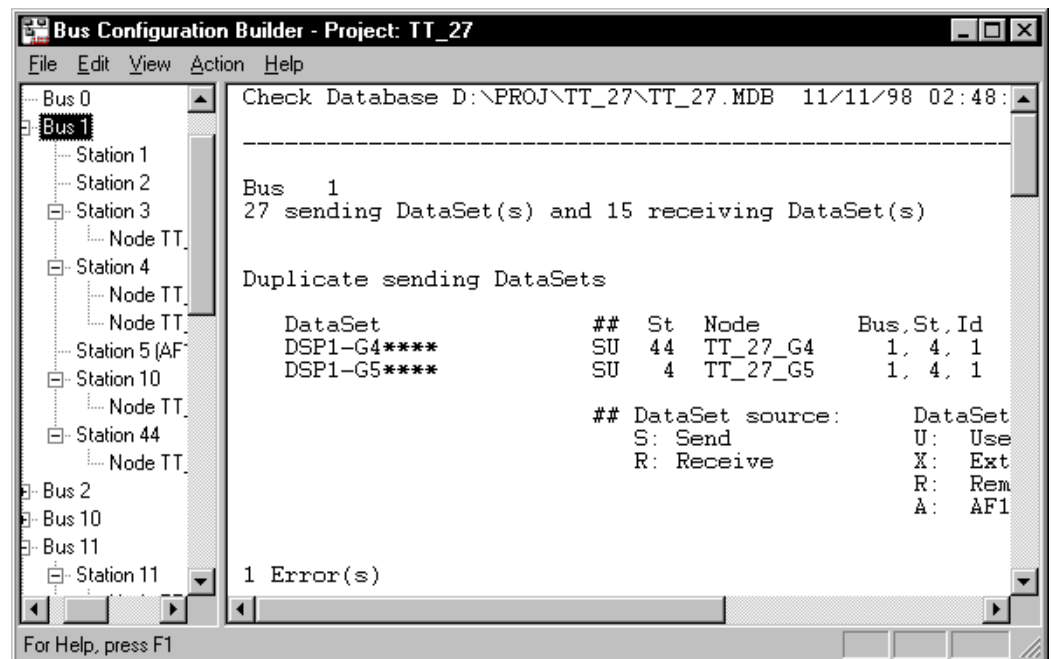


Figure 3-9. Report in Right Pane

See further Section 3.5.1.7, Examples of Reports.

3.5.1.6 Bus Load Calculation

The bus load is calculated for all sending DSPs by the following formula:

$$Busload = \left(\sum_{DSP1}^{DSPn} T_{tr} / (CTFact \times CYCLETIM) \right) \times 100$$

Bus load: value calculated in %
 T_{tr} : transfer time of sending DSPs in ms
 CTFact: factor depending on bus length
 CYCLETIM: desired cycle time in ms (1, 2, 4, 8, 16, ..., 4096)

The transfer times for DataSets depend on the number of attached DAT elements and the bus length:

Table 3-1. DataSet Transfer Times, Bus Length up to 2000m

DataSet Size	Transfer Time (ms)	CTFact
1 DAT element	0.088	1.0
2 DAT elements	0.108	
3-4 DAT elements	0.156	
5-8 DAT elements	0.252	

Table 3-2. DataSet Transfer Times, Bus Length up to 8500m

DataSet Size	Transfer Time (ms)	CTFact
1 DAT element	0.168	1.008
2 DAT elements	0.188	
3-4 DAT elements	0.236	
5-8 DAT elements	0.332	

Table 3-3. DataSet Transfer Times, Bus Length up to 15000m

DataSet Size	Transfer Time (ms)	CTFact
1 DAT element	0.248	1.008
2 DAT elements	0.268	
3-4 DAT elements	0.316	
5-8 DAT elements	0.412	

Example of BCD Check Report

```

Check Database D:\PROJ\TT_27\TT_27.MDB 11/16/98 02:42:36 PM
-----
Bus 2
4 sending DataSet(s) and 0 receiving DataSet(s)

Duplicate sending DataSets
0 Error(s)

Receiving DataSet(s) without sending DataSets
0 Warning(s)

Sending DataSet(s) without receiving DataSets
  DataSet      ## St Node      Bus,St,Id
  DSP2-G3****  SU  3 TT_27_G3    2, 3, 1
  DSP2-G4****  SU  4 TT_27_G4    2, 4, 2
  DSP2-G5***** SU  4 TT_27_G5    2, 4, 1
  DSP1-GB****  SU 11 TT_27_GB    2,11, 1

                ## DataSet source:   DataSet created by:
                S: Send              U: User
                R: Receive            X: Extended DB element

4 Warning(s)

Different data types and cycle times of sending and receiving DataSets
0 Warning(s)

```

Figure 3-11. BCD Check Report, Example

Example of DataSet Cross Reference Report

Cross Reference of DataSets D:\PROJ\TT_27\TT_27.MDB 11/16/98 02:44:32 PM									

Bus 2									
4 sending DataSet(s) and 0 receiving DataSet(s)									
DataSet	##	St	Node	Bus,St,Id	Ref 1				Ref 8
DSP2-G3****	SU	3	TT_27_G3	2, 3, 1	IL,IL,IL,IL,IL,IL,IL,IL				
DSP2-G4****	SU	4	TT_27_G4	2, 4, 2	IL,IL,IL,IL,IL,IL,IL,IL				
DSP2-G5*****	SU	4	TT_27_G5	2, 4, 1	IL,IL,IL,IL,IL,IL,IL,IL				
DSP1-GB****	SU	11	TT_27_GB	2,11, 1	IP,IL,IL, R, -, -, -, -				
## DataSet source:					DataSet created by:				
S: Send					U: User				
R: Receive					X: Extended DB element				
					R: Remote I/O element				

Figure 3-12. DataSet Cross Reference Report, Example

Example of Extended DB Element Cross Reference Report

Cross Reference of Extended DB Elements C:\PROJ\TT_27\TT_27.MDB 28.10.99							

Bus 55							
14 extended DB element(s)							
Extended DB Element	##	St	Node	Bus,	St,	Id,Ref	Type ItemDes
my-mb1	PS	3	TT_27_X4	55,	50,	50, 1	MBS MB1.1
my-mb1	RR	33	TT_27_X2	55,	50,	50, 1	MBS MB1.1
my-mb3	PS	3	TT_27_X4	55,	50,	50, 1	MBS MB1.3
my-mb2	PS	3	TT_27_X4	55,	50,	50, 1	MBS MB1.2
my-mb2	RR	33	TT_27_X2	55,	50,	50, 1	MBS MB1.2
my-mb	PS	3	TT_27_X4	55,	50,	50, 1	MB MB1
my-mb	RR	33	TT_27_X2	55,	50,	50, 1	MB MB1
Second_Signal	RR	33	TT_27_X2	55,	22,	10, 7	AOS AOS1
First_Signal_1234567	PS	33	TT_27_X2	55,	22,	3, 2	AIS AIS1
AOS2	RR	33	TT_27_X2	55,	44,	50, 4	AOS AOS2
Diff_Name_Signal_2	PN	33	TT_27_X2	55,	33,	10, 3	DIS DIS1
MB66	PN	33	TT_27_X2	55,	1,	1, 1	MB MB66
MB12ofSiganla4*****	PN	33	TT_27_X2	55,	1,	1, 1	MBS MB66.1
dup32	PN	33	TT_27_X2	55,	1,	1, 1	MBS MB66.32
## Source:				DataSet communication:			
H: Hardware				S: Send			
P: PC element				R: Receive			
R: Receive				N: None			
M: MMI							

Figure 3-13. Extended DB Element Cross Reference Report, Example

Example of BCD Dump Report

```

Dump of bus configuration database D:\PROJ\TT_27\TT_27.MDB 11/16/98 02:
-----
Bus 2:
  Station: 3
    Node: Name      TT_27_G3
          Node Type  AC 110 2.2  CONTR
          Net_Node   1,1
          Position    1
          FCB version 4.6/0B2
          BOIL version 1.0/0
          Timestamps  981029130928362  NULL

          PM : PM632          PM1          Created by User
                NAME          A  PM1-G3*****
                BUS            I  0
                STATION        I  0
                POSITION        I  1
                IMPL            B  1
                TYPE            E  PM632
                WITH_BAT        B  1
                CH2             XR

          CI : CI626          CI1          Created by User
                NAME          A  CI1-G3*****
                BUS            I  0
          .....
  
```

Figure 3-14. BCD Dump Report, Example

3.5.2 Workflow - Bus Configuration Builder for AF100 OPC

3.5.2.1 Step 1 - Prepare Input for Bus Configuration Database

As preparation perform the following activities:

1. Create a project with the Application Builder.
It is assumed that this project contains the AC 100 Series and possibly also AC 400 Series nodes of a network with one or several AF 100 busses.
The Application Builder creates automatically an empty Bus Communication Database.
You can also create a new Bus Communication Database for the project with the Bus Configuration Builder.
BCD is initially empty.
2. Create a node for each AC 100 Series (and AC 400 Series) participating in the network with the Application Builder.
3. Build an application for each AC 100 Series node with the Function Chart Builder.
You may use extended DB elements and define by them the signal names to be used by HMI. Or you can instantiate manually DAT_AI, DAT_AO, DAT_DAT, DAT_DI, and DAT_DO elements for this purpose. Or you let the Function Chart Builder generate DAT_DAT elements at target code generation.

4. Generate target code.

For this, use the **File | Generate Target Code** Function Chart Builder command.

Be sure to select the **Support Bus Configuration Database** check box in the **Generate Target Code** dialog box.

Select the **All DSPs Visible in AF100 OPC** check box if you need automatic DAT_DAT generation.

The Function Chart Builder creates descriptions of the communication data of the node and fills the BCD of the project.

5. Build an application for each involved AC 400 Series node with the Function Chart Builder and generate BCD data.

For this, use the **File | Generate BCD Data** Function Chart Builder command.

The Function Chart Builder creates descriptions of the communication data of the node, generates DAT_DAT elements automatically, and fills the BCD of the project.

3.5.2.2 Step 2 - Start Bus Configuration Builder

1. Start the Bus Configuration Builder from the **Tools** menu of the Application Builder.
2. Select the **Bus Configuration Builder** option in the **Select Environment** dialog box.
3. Activate the **OK** button.

You can use the appropriate command from the menu bar of the **Bus Configuration Builder** application window to

- View the structure of the Bus Configuration Database
- Modify the structure of the Bus Configuration Database.

3.5.2.3 Step 3 - Modification of Bus Configuration Database

To fill the Bus Configuration Database with new data, generate target code again for the concerned AC 100 Series nodes and BCD data for the concerned AC 400 Series nodes with the Function Chart Builder.

For this, use the **File | Generate Target Code** and the **File | Generate BCD Data** Function Chart Builder commands.

Use the appropriate commands from the menu of the **Bus Configuration Builder** application window to

- Create an additional AF 100 bus.

This function facilitates creation of AF100 OPC stations on busses not handled by the Application Builder and the Function Chart Builder.

- Create AF100 OPC stations.

This function allows to configure AF100 OPC stations and can be relevant for more precise bus load calculation.

This is important to start configuration also without any ready AC 100 or AC 400 node.

- Delete the whole Bus Configuration Database or a part of it.

See also Section 3.5.2.6, New Configuration After On-line DB Change.

3.5.2.4 Step 4 - Check of Bus Configuration

Use the appropriate commands from the menu bar of the Bus Configuration Builder application window to

- Calculate the bus load on all AF 100 busses of the project or on a selected bus.

Use the **Action | Bus Load Calculation** command.

- Check the BCD

Use the **Action | Check Database** command.

This function

- Checks duplicate sending DataSets, receiving DataSets without sending DataSets, sending DataSets without receiving DataSets.
- Compares data types and cycle times of sending and receiving DataSets.
- Checks duplicate extended DB element sources.
- Checks different DataSet communication terminals and different DB element types of corresponding extended DB elements.
- Checks different extended DB elements for the same DataSet communication terminals.

- Report cross reference of DataSets.

Use the **Action | Cross Reference of DataSets** command.

- Report cross reference of extended DB elements.

Use the **Action | Cross Reference of Extended DB Elements** command.

- Dump the BCD.

Use the **Action | Dump Database** command.

This function displays, in fact, the relevant DB element instances with their terminal values for all nodes.

NOTE

In case of AC 400 Series, S800 I/O is realized partly in the PC section. The PC part is not reflected in the Bus Configuration Database, hence not checked by the Bus Configuration Builder and not reflected in the calculated bus load.

The Bus Configuration Builder offers all of these reports in the right pane of the **Bus Configuration Builder** application window. You can also print them by the **File | Print** command.

To achieve an appropriate bus configuration, inspect the reports, identify the problems, and correct the errors by repeatedly using the Function Chart Builder and the Bus Configuration Builder.

3.5.2.5 Step 5 - Export Data to AF100 OPC

The Bus Configuration Database and its parts can be accessed via the Bus Configuration Interface implemented according to the Microsoft COM software interface specification.

So, AF100 OPC can read all communication data necessary for Human-Machine Interface systems—or for any other OPC client—to access signals of AF 100 nodes within the project.

3.5.2.6 New Configuration After On-line DB Change

On-line changes become valid in the target with the execution of a **File | Save and Load** command of the Function Chart Builder.

Depending on the recent selection of the **Support Bus Configuration Database** check box in the **Generate Target Code** dialog box, the Function Chart Builder updates the Bus Configuration Database and attaches a time stamp to it.

AF100 OPC can detect the change of the time stamp and in due case read the new communication data and update its services for the Human-Machine systems—or for any other OPC client.

3.5.3 Application of Bus Configuration Builder for AdvaSoft for Windows

3.5.3.1 Bus Configuration Builder - AdvaSoft for Windows, Background

Environment

As an example of Bus Configuration Builder serving for AdvaSoft for Windows, a possible network configuration is shown in Figure 3-15.

The Bus Configuration Builder supports the shaded area.

The Bus Configuration Builder is a tool logically placed between Function Chart Builder and AdvaSoft for Windows. It collects the communication data configured by the Function Chart Builder for the Advant Controller 100 Series nodes of a project and stores this information in files in the corresponding bus directory (compound description lists, source code, and target code). Now the data are available for AdvaSoft for Windows.

Further on, it prepares for each AdvaSoft node a description which includes receivers for each sending DataSets of an Advant Controller 100 Series and senders for the receiving DataSets carrying the station number of this AdvaSoft node. So, you can configure the data exchange according to your special needs.

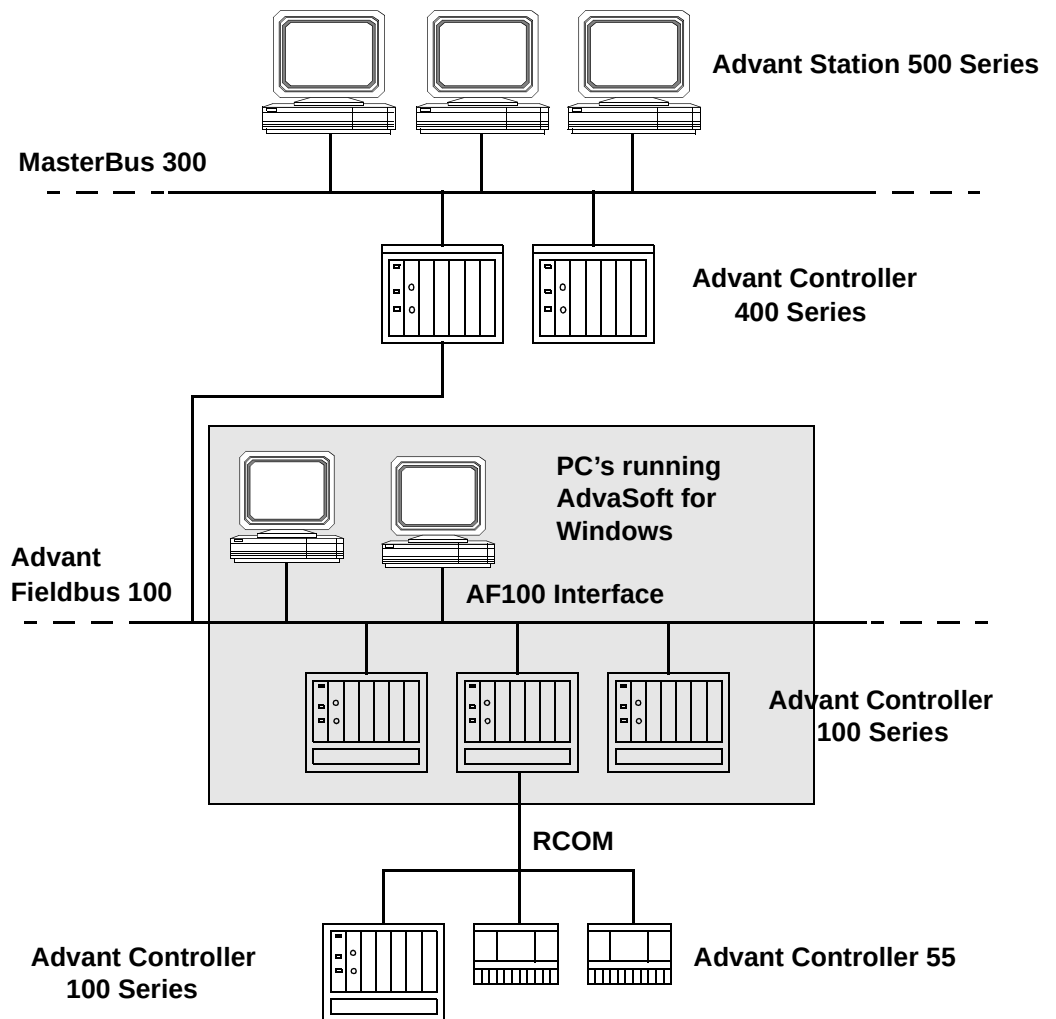


Figure 3-15. Example of a DCS Network with AdvaSoft for Windows

Configuration Interfaces of AdvaSoft for Windows for AC 100 Series

There are two configuration interfaces towards AdvaSoft for Windows connected to Advant Controller 100 Series:

- The Bus Object Information List (BOIL), which does not require Bus Configuration Builder
- The Configuration Object Information List (COIL), which requires Bus Configuration Builder.

Table 3-4 and Table 3-5 show the supported interfaces:

Table 3-4. Supported Interfaces of Advant Controller 100 Series to AdvaSoft for Windows, Part 1

	Advant Controller 55		Advant Controller 70		Advant Controller 80
	1.0	1.1	1.0	1.1	1.0
AdvaSoft for Windows 1.0	-	-	COIL	COIL	COIL
AdvaSoft for Windows 1.1	-	-	COIL	COIL	COIL
AdvaSoft for Windows 1.2	-	-	COIL	COIL	COIL
AdvaSoft for Windows 1.3	-	-	COIL	BOIL, COIL	BOIL, COIL

Table 3-5. Supported Interfaces of Advant Controller 100 Series to AdvaSoft for Windows, Part 2

	Advant Controller 110			Advant Controller 160	
	2.0	2.1	2.2	1.0	1.1
AdvaSoft for Windows 1.0	COIL	COIL	COIL	-	-
AdvaSoft for Windows 1.1	COIL	COIL	COIL	-	-
AdvaSoft for Windows 1.2	COIL	COIL	COIL	-	-
AdvaSoft for Windows 1.3	BOIL, COIL	BOIL, COIL	BOIL, COIL	BOIL, COIL	BOIL, COIL

The COIL Interface

The COIL interface supports data exchange via Advant Fieldbus 100.

COIL stands for **C**onfiguration **O**bject **I**nformation **L**ist. The corresponding files are called COIL files, their description see in Section A.2, Directories and Files - BCB for AdvaSoft for Windows.

The COIL interface does not support extended DB elements and does not support AdvaSoft - Advant Controller remote communication via RCOM.

In case of using extended DB elements (XDBs), the Bus Configuration Builder is not required. Nevertheless, it is possible to calculate the bus load with Bus Configuration Builder.

Stations on Advant Fieldbus 100 can be (see also Figure 3-15):

- Advant Controller 100 Series
- AdvaSoft for Windows
- Advant Controller 400 Series.

Although Advant Controller 400 Series can be connected to the Advant Fieldbus 100, the configuration of the communication will not be done automatically with Bus Configuration Builder.

The Bus Configuration Builder reuses the configuration of communication data prepared for each Advant Controller 100 Series connected to an Advant Fieldbus 100, to make them available for the configuration of AdvaSoft for Windows. Therefore, you do not have to configure the communication twice.

The communication data of Advant Controller 100 Series nodes are configured with the Function Chart Builder.

Data exchange consists of the following (and is represented by the following DB elements):

- Data subscription (DSP/DAT)
- Events (EVS/AIC, DIC or DIS)
- Commands (DAT and PAR DAT).

The Bus Configuration Builder collects these data and generates files, which hold:

- DataSet transfer information
- EventSet transfer information
- Service transfer information
- Header information
- Listing which contains information, warning, error messages.

Communication Flow

While collecting communication data, the Bus Configuration Builder reads COIL files, which are produced by the Function Chart Builder when preparing target code for each station connected to a given Advant Fieldbus 100.

The Bus Configuration Builder prepares a compound description of the communication data and a description for each AdvaSoft node which includes all receivers and senders for the individual node. That description then can be read by AF 100 Object Configuration software, which is part of the interface towards AdvaCommand for Windows and AdvaInform for Windows.

Figure 3-16 illustrates the flow of communication from Function Chart Builder to Bus Configuration Builder and from there to AdvaSoft for Windows.

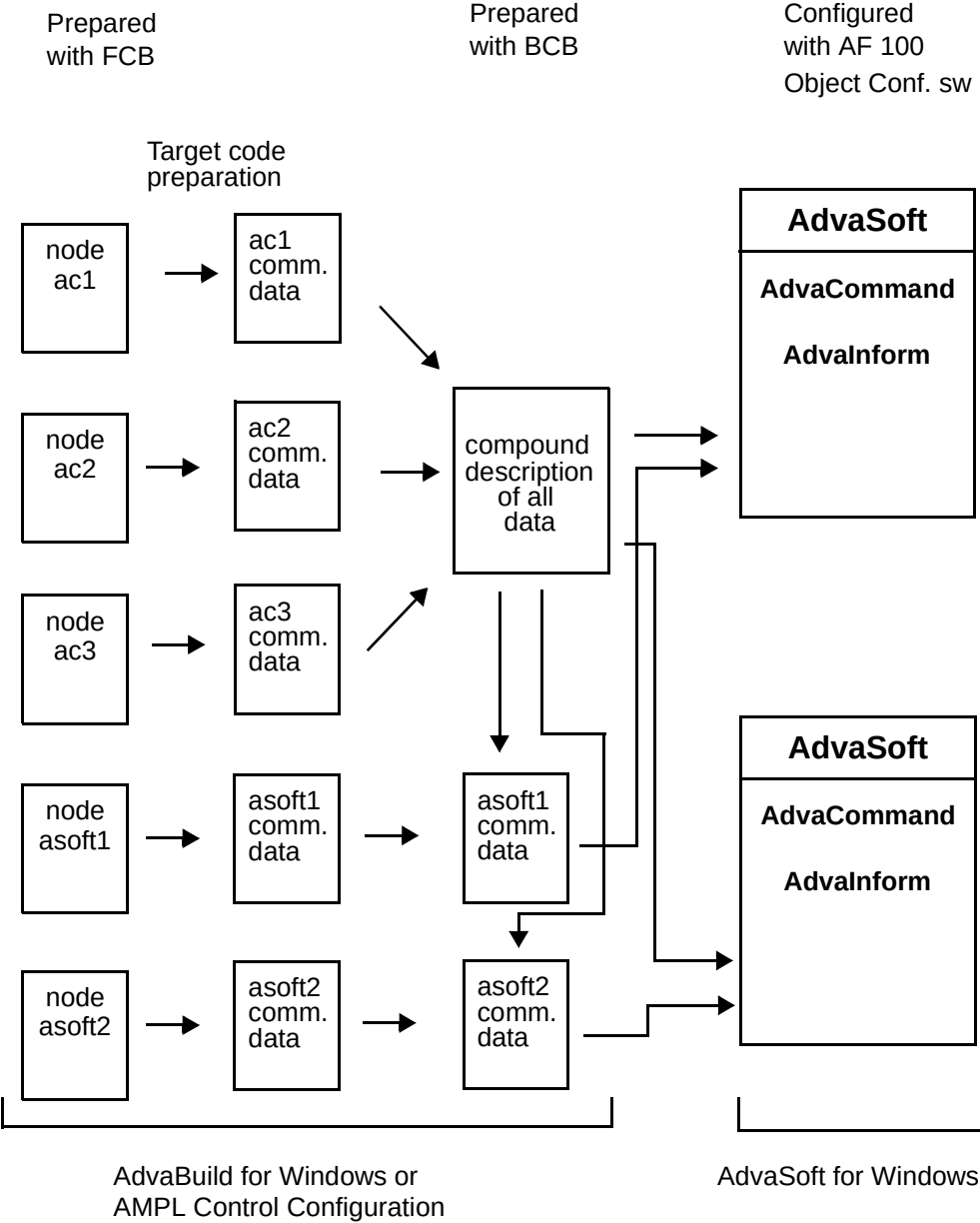


Figure 3-16. Data Flow of Communication Data FCB-BCB-AdvaSoft

3.5.3.2 Bus Configuration Builder - AdvSoft for Windows, Preconditions

The following general preconditions must be fulfilled before you start the Bus Configuration Builder for AdvSoft for Windows (version 3.11):

1. The version number of the involved Advant Controller 100 Series nodes and AdvSoft nodes must correspond to supported cases in Table 3-4 and Table 3-5.
2. The bus number or the selected bus number, as applicable, of any node must be in the range from 0 to 255.
3. The station number of all AdvSoft nodes must be in the range from 1 to 79.
4. At least one node of type AdvSoft and one of type AC 70, AC 80, AC 110, or AC 160 must exist. If necessary, for each AdvSoft node create a node with the **File | New | Node** menu of the Application Builder:
 - a. Select an AdvSoft node as node type that corresponds to the AdvSoft for Windows version you work with.
 - b. The station number must be greater than 0; station 0 is treated as a local station, that means without connection to Advant Fieldbus 100.
5. The correct bus, station, and position numbers must be entered in Application Builder—at the latest before generating target code in Function Chart Builder.
6. For all involved Advant Controller 100 Series and AdvSoft nodes target code must be generated by the Function Chart Builder to produce the corresponding COIL files.

If necessary, for each node generate target code:

- a. Start the Function Chart Builder from the Application Builder's **Tools** menu.
 - b. If the default values of the communication interface DB element (for example CI526) doesn't fit, modify them in the DB section.
 - c. Generate target code (Function Chart Builder's File menu) and terminate the Function Chart Builder.
7. Restrictions for backtranslate of BCB01.BAX (see Section 3.5.4.3, Step 3 - Modification of Data Prepared During Step 2):
 - The object names and item designations of the data base elements DSP and DAT used in the AMPL programs running on the Advant Controller 100 Series connected to the dedicated Advant Fieldbus 100, must be unique.
For a description of the **Renumber Item Designation** feature, see Section 3.5.3.4, Functions of Bus Configuration Builder for AdvSoft for Windows.
See also Figure 3-17, Select Environment Dialog of Bus Configuration Builder.
 - The length of the common data area of Advant Controller 100 Series is limited to 8 kilobyte. The database elements DAT and DSP are located in this area.
The memory requirements for these database elements are described in *Data Base Elements Advant Controller 70 Reference Manual*, *Data Base Elements Advant Controller 110 Reference Manual*, and so on. This restriction will be checked also by the Function Chart Builder when generating target code from backtranslated BCB01.BAX for AdvSoft nodes.

3.5.3.3 Bus Configuration Builder - AdvaSoft for Windows, Proceeding

General

1. To start the Bus Configuration Builder, open the corresponding project in the Application Builder. It is assumed that all stations on the Advant Fieldbus 100, you want to generate communication data for, are gathered in one project of the Application Builder. Several Advant Fieldbus 100 may belong to one project.
2. The Bus Configuration Builder is one of the Builders of AdvaBuild for Windows or AMPL Control Configuration. Start it from the Application Builder, for example, from its **Tools** menu. The following start-up dialog will be displayed:

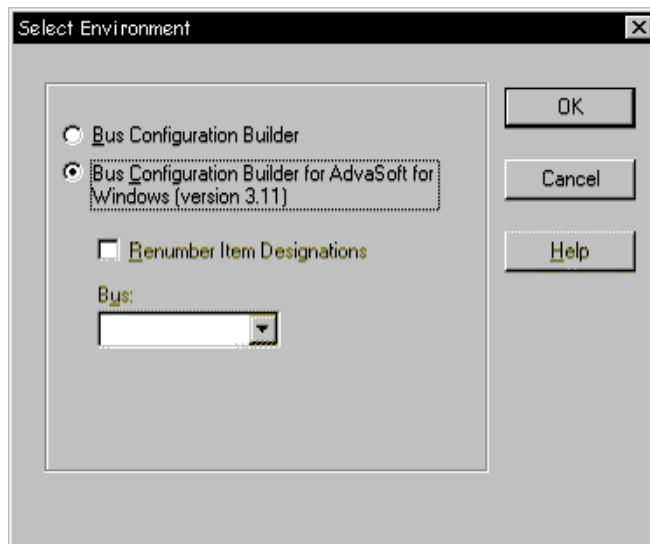


Figure 3-17. Select Environment Dialog of Bus Configuration Builder

3. Select the environment you want to work in:

Select **Bus Configuration Builder for AdvaSoft for Windows (version 3.11)** if you want to use the Bus Configuration Builder to generate configuration data for AdvaSoft for Windows.
Set also the bus number of the Advant Fieldbus 100, you want to prepare communication data for, in the **Bus** field.
If you allow to renumber item designations, check the corresponding field.
4. Click **OK** to start the Bus Configuration Builder.

Bus Configuration Builder - AdvaSoft for Windows

The Bus Configuration Builder starts, processes the available input information, generates the output files, and writes messages about the performed actions to its output window (in fact, in the BCB application window, see Figure 3-18):

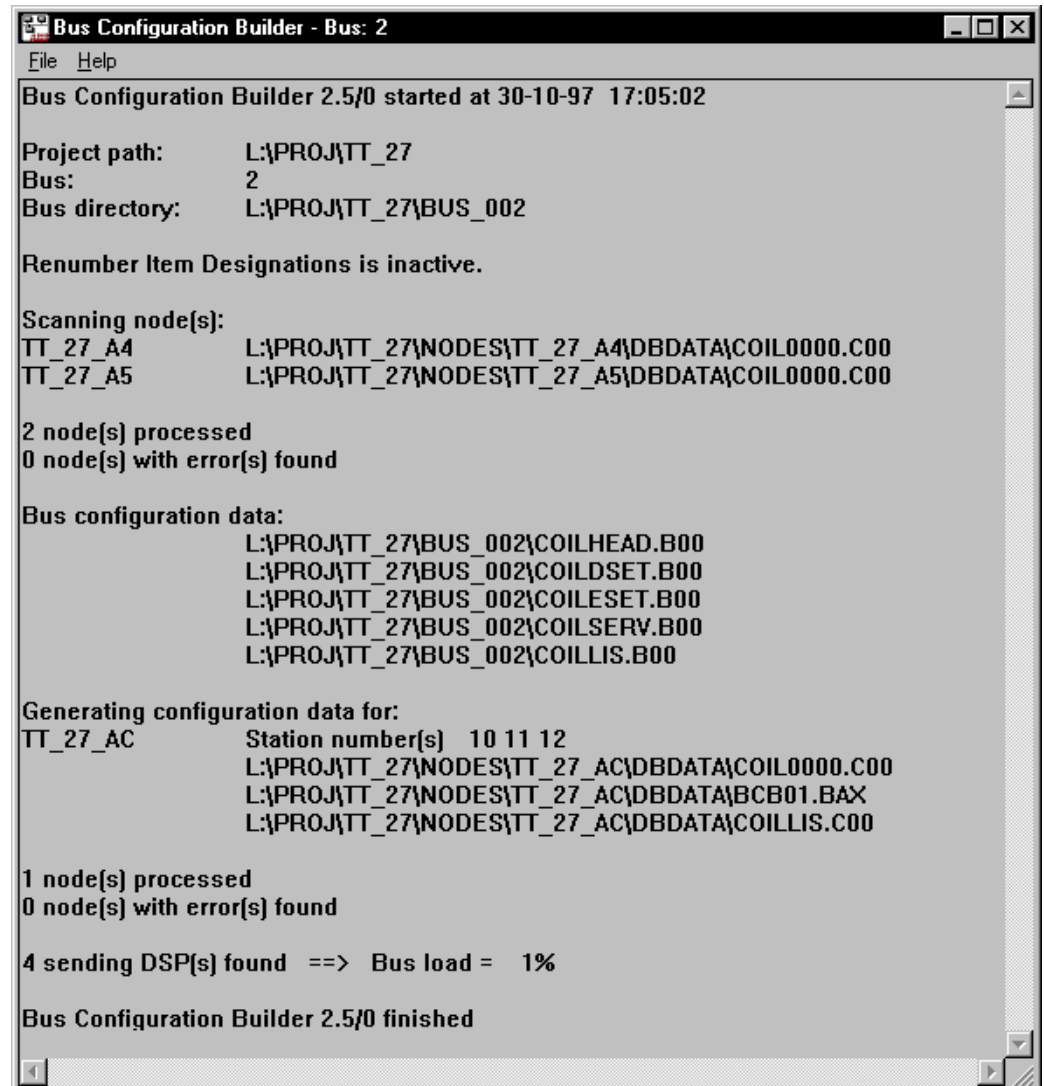


Figure 3-18. Output Window of Bus Configuration Builder

If errors occurred the Bus Configuration Builder writes the path of a report file (COILLIS.C00) into its window. In this file the errors are described.

The data the Bus Configuration Builder produces, are stored at different locations:

- The Bus Communication Database in the general bus directory of the project.
- The compound description of all communication data in the bus directory of the corresponding bus.
- The AdvaSoft node specific data in the node directory structure of the corresponding node.

3.5.3.4 Functions of Bus Configuration Builder for AdvaSoft for Windows

There are two possibilities to configure the AdvaSoft nodes:

- The functionality of the AdvaSoft nodes matches the DSP functionality of the Advant Controllers 100 Series exactly and is for both AdvaSoft nodes the same (but the nodes are located at different places).

Then the two AdvaSoft nodes shall be configured in the same way.

- The functionality of the two AdvaSoft nodes differs from each other or does not match exactly the DSP functionality of the Advant Controllers 100 Series (for example, there is also an Advant Controller 400 Series Controller on the Advant Fieldbus 100). For that case there is the possibility to adapt the DSP configuration data to current needs. This is done by backtranslating the automatically generated AMPL DB source code file (BCB01.BAX) and manipulating it in one of the following ways:
 - Before backtranslation with a text editor (for example AS100-EDIT)
 - After backtranslation with the DB editor of the Function Chart Builder.

With that modifications, target code has to be generated for the two AdvaSoft nodes.

The underlying network situation matches the following list of nodes of the Application Builder shown in Figure 3-19:

Node	Node Type	Net, Node	Bus, Station	RNet, RNode	Positid	Comment
ac1	AC 110 2.2	0,0	3,3		1	Station 3
ac2	AC 110 2.2	0,0	3,8		1	Station 8
ac3	AC 110 2.2	0,0	3,17		1	Station 17
asoft1	AdvaSoft 1.2	0,0	3,10		1	AdvaSoft
asoft2	AdvaSoft 1.2	0,0	3,15		1	AdvaSoft

Figure 3-19. Node List of the Example Configuration

The function of the Bus Configuration Builder can be divided into two phases:

- Scanning all Advant Controller 100 Series connected to one Advant Fieldbus 100 for communication data and preparing a compound description of these data.
- Preparing configuration information for the involved AdvaSoft nodes.

These two phases are described in detail below.

The result of the first phase is a description of the traffic on the Advant Fieldbus 100. Therefore, these data are located in the corresponding bus directory. In the example it is the directory BUS_003, a subdirectory to the project directory (see Figure A-2).

The configuration information generated in the second phase is specific to the individual AdvaSoft node. The Bus Configuration Builder prepares a description of all DSP data:

- A receiver DSP to every sender DSP of the Advant Controller 100 Series stations
- A sender DSP to every receiver DSP of the Advant Controller 100 Series stations belonging to the related AdvaSoft station numbers.

Scanning All Advant Controller 100 Series

The Bus Configuration Builder scans all nodes of the current project opened by the Application Builder

- Belonging to the specified bus and
- With target type AC 100 Series.

It takes the information from COIL files located in the DBDATA subdirectory of these nodes.

The Bus Configuration Builder generates the following common files for all of these nodes:

- COILLIS.B00: a listing file which contains information, warnings and error messages and the calculated bus load
- COILDSET.B00: containing access information for DataSet transfer
- COILESET.B00: containing access information for EventSet transfer
- COILSERV.B00: containing access information for service transfer
- COILHEAD.B00: containing head line information.

It writes the generated data to a special bus directory BUS_ *nnn*, where *nnn* is the bus number, for example, BUS_003.

(For each Advant Fieldbus 100, the Bus Configuration Builder generates data for, there is a BUS_ *nnn* directory. If the directory does not exist, the Bus Configuration Builder creates it.)

Preparing Information for AdvaSoft Nodes

The Bus Configuration Builder scans all nodes of the current project:

- Belonging to the specified bus and
- With target type AdvaSoft.

It takes the information from the COIL files located in the DBDATA subdirectory of the corresponding nodes.

The Bus Configuration Builder generates the following files for each of these nodes:

- COILLIS.C00: a listing file which contains information, warnings and error messages
- COIL0000.C00: containing configuration information for the AdvaSoft node

- BCB01.BAX: containing AMPL data base source code for the DSPs (same configuration as described in COIL0000.C00), that may be backtranslated by the Function Chart Builder for further configuration purposes.

The Bus Configuration Builder prepares also the following information for each AdvSoft node:

- Receiving DataSets for all sending DataSets of the involved Advant Controller 100 Series
- Sending DataSets that correspond to receiving DataSets of the Advant Controller 100 Series.

It writes the generated data to the DBDATA subdirectory of the corresponding AdvSoft node, for example

C:\PROJECTS\BCB_TEST\NODES\ASOFT1\DBDATA

For sending DataSets the Bus Configuration Builder checks further on the uniqueness of the pair [IDENT, STATION] for the given Advant Fieldbus 100.

Increase Maximum Number of Sending DataSets

50 is the maximum number of sending DataSets for one station.

If an AdvSoft node shall be configured to send more than 50 DataSets, you have to use more than one station number for this node.

In this case the station numbers, the AdvSoft node uses for sending DataSets, must be listed in an ASCII text file named DSP_STAT.DAT. It contains the station numbers separated by blanks.

Example of DSP_STAT.DAT:

12 17 35

This means that the corresponding AdvSoft node can send DataSets under station number 12, 17 and 35.

The file can be created with a text editor, for example AS100-EDIT (see Application Builder, **Tools** menu). The file must be located in the DBDATA subdirectory of the corresponding AdvSoft node, for example

C:\PROJECTS\BCB_TEST\NODES\ASOFT1\DBDATA\DSP_STAT.DAT.

Renumber Item Designation

If the **Renumber Item Designations** feature is active, the Bus Configuration Builder generates the COIL0000.C00 and BCB01.BAX files with modified contents:

- The item designations of the data base elements DSP and DAT will be numbered automatically. The numbering starts with one and the successive numbers are incremented by one: DSP1, DSP2, DSP3,...
- If the names of the data base elements are identical with the default values, then the names are numbered in exactly the same way as the item designations: DAT1, DAT2, DAT3, ...

Bus Load Calculation

The bus load is calculated for all sending DSPs by the following formula:

$$Busload = \left(\sum_{DSP1}^{DSPn} T_{tr}/cT \right) \times 100$$

Busload: value calculated in %

T_{tr} : transfer time in ms

cT : desired cycle time in ms (1, 2, 4, 8, 16, ..., 4096)

The transfer times for data sets depend on the number of attached DAT elements:

Table 3-6. Transfer Times for Data Sets

DataSet Size	Transfer Time (ms)
1 DAT element	0.088
2 DAT elements	0.108
3-4 DAT elements	0.156
5-8 DAT elements	0.252

This formula does not take the bus length over 2000 m into account.

If you are using the BOIL interface and you want to have the bus load calculated by the Bus Configuration Builder do the following steps:

1. Every Advant Controller 100 Series and AdvaSoft for Windows node in Application Builder must have the correct bus and station number there.
2. Generate target code in Function Chart Builder for every Advant Controller 100 Series and every AdvaSoft for Windows node of that bus.
3. Run Bus Configuration Builder with the correct bus number.

NOTE

The bus load part caused by data communication for Remote I/O is not calculated in Bus Configuration Builder.

3.5.4 Workflow - Bus Configuration Builder for AdvaSoft for Windows

3.5.4.1 Step 1 - Prepare Input for Bus Configuration Builder

Before you start the Bus Configuration Builder perform the following activities:

- Create a project with the Application Builder.
- Create a node for each Advant Controller 100 Series with the Application Builder.
- Build an application for each Advant Controller 100 Series with the Function Chart Builder and generate target code.
- Create a node for each AdvaSoft node with the Application Builder.

- Build an application for each AdvSoft node with the Function Chart Builder and generate target code. The minimum application consists of the automatically created CI DB element.

3.5.4.2 Step 2 - Start Bus Configuration Builder

In step 1 the Function Chart Builder has created descriptions of the communication data of each Advant Controller 100 Series. These data are used in step 2 by the Bus Configuration Builder:

- Start the Bus Configuration Builder from the **Tools** menu of the Application Builder.
- Select the **Bus Configuration Builder for AdvSoft for Windows (version 3.11)** option in the **Select Environment** dialog box.
- Select the bus number of the Advant Fieldbus 100 in the **Bus** field and specify whether the **Renumber Item Designations** feature shall be active or inactive.
- Activate the **OK** button.

The Bus Configuration Builder prepares now the compound description of all communication data and the configuration information for each AdvSoft node.

3.5.4.3 Step 3 - Modification of Data Prepared During Step 2

If you want to modify the communication data prepared automatically during step 2, use the Function Chart Builder. It may be meaningful, for example, to delete some of the DataSets for a specific AdvSoft node.

In this case, start the Function Chart Builder from the **Tools** menu of the Application Builder for the AdvSoft node concerned and perform the following actions:

- Backtranslate the source code of the corresponding AdvSoft node stored in the file BCB01.BAX.
- Create, modify, or delete data base elements of type DSP or DAT in the DB section.
- Generate target code.

3.5.4.4 Step 4 - Export Data to AdvSoft for Windows

Copy all files from the bus directories and from the DBDATA subdirectory of each AdvSoft node to the personal computer, on which AdvSoft for Windows is running. For the exact description of the location refer to the AdvSoft for Windows documentation.

3.5.4.5 New Configuration After On-line DB Change

The **File | Generate Target Code** menu command of the Function Chart Builder sets the version of the COIL files to 0 (see Section A.2.2.2, Files on Node Directories).

On-line changes become valid in the target with the execution of a **File | Save and Load** command of the Function Chart Builder. This command implies a partial target code generation. The pertaining COIL file is also updated: Every on-line change of the DB part of a user application program increments the version of the COIL files.

After an on-line change of DB part, you must decide if a start of Bus Configuration Builder and a new configuration of AdvSoft for Windows is necessary.

3.6 Configuration/Application Building Menus

NOTES

All the listed menus and menu commands are available only if you are working under Windows NT and using Bus Configuration Builder (32-bit version, for AF100 OPC).

If you are using Bus Configuration Builder for AdvaSoft for Windows (version 3.11), only menus **File** and **Help** and commands **File | Exit**, **Help | Contents**, **Help | Release Notes**, and **Help About BCB** are available.

3.6.1 File Menu

3.6.1.1 File | New Database

Shortcut: CTRL+N

Use this command to create a new empty Bus Configuration Database.

3.6.1.2 File | Delete Database

Use this command to delete the current Bus Configuration Database.

3.6.1.3 File | Compact Database

Use this command to compact the current Bus Configuration Database, in fact the *project.MDB* file.

3.6.1.4 File | Save As

Shortcut: CTRL+S

Select the right pane of the Bus Configuration Builder application window with some report. Use this command to save it as a text file with a certain name.

Select the left pane of the Bus Configuration Builder application window with tree structure of the Bus Configuration Database.

Use this command to

- Convert the structure tree into simple list form
- Save it as a text file.

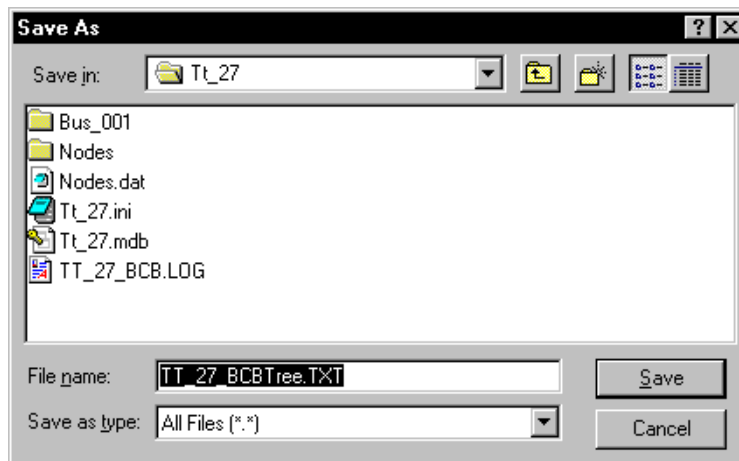


Figure 3-20. Save As

- **Save in (Directory)**

The symbol shows the directory currently browsed for files.

Default is the project directory.

You can also select a subdirectory in the list box below.

Or go to the directory on the next higher level by clicking on the **Up One Level** icon.

Click on the **Create New Folder** icon to create a new subdirectory.

- **Up One Level and Create New Folder (Icons)**

Click on the **Up One Level** icon to go to the directory on the next higher level.

Click on the **Create New Folder** icon to create a new subdirectory.

- **List and Details (Icons)**

Click on these icons to display the files and subdirectories in corresponding forms.

- **Files and Subdirectories**

The list box contains all available files and subdirectories in the specified directory, which correspond to the filter condition.

Click on the **List** and **Details** icons to display the files and subdirectories in corresponding forms.

- **File Name**

Select a file name from the list box or type it here.

Or edit here a new filter condition, for example, MY*.TXT, and press ENTER to make it effective.

- **Save as Type**

Select a filter condition from the standard filters in this drop-down list box.

If *.TXT is set, extension .TXT (default extension of report files) will be appended to the file name.

- **Save**

Activate this button to start saving.

3.6.1.5 File | Page Setup

Use this command to setup the page layout for reports to be printed.

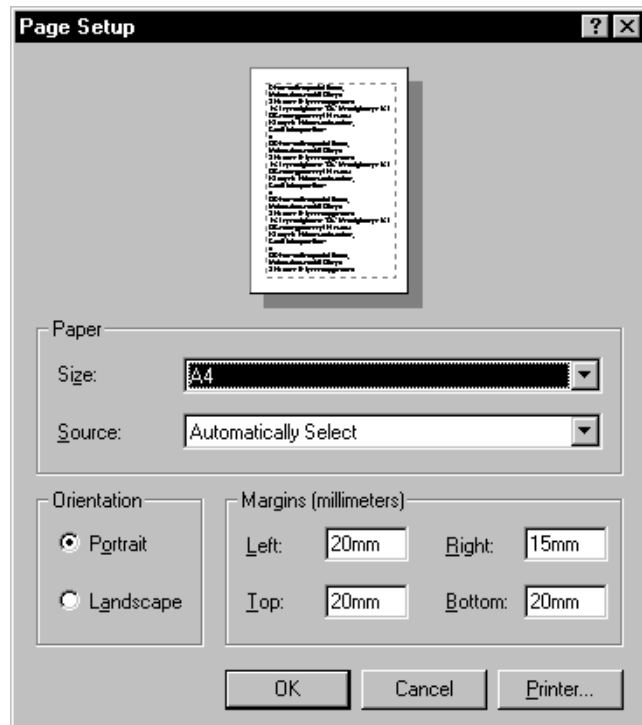


Figure 3-21. Page Setup

- **Preview**

See exemplary appearance of report pages here.

- **Paper Size and Source**

Select the size of paper that the report is to be printed on.

Some printers offer multiple trays for different paper sources. Specify the tray here.

- **Orientation**

Select **Portrait** or **Landscape**.

Check appearance in the upper third of the dialog.

- **Margins**

Set size of the margins.

Check appearance of report pages in the upper third of the dialog.

- **Printer**

Activate this button to open a simplified printer setup dialog.

You can check the selected printer, inspect and change the printer properties, select another printer, and reach a printer via network.

See also Section 3.6.1.7, File | Print Setup for printer changes.

3.6.1.6 File | Print

Shortcut: CTRL+P

Select the right pane of the **Bus Configuration Builder** application window with some report. Use this command to print it.

Select the left pane of the **Bus Configuration Builder** application window with tree structure of the Bus Configuration Database.

Use this command to

- Convert the structure tree into simple list form
- Print it.

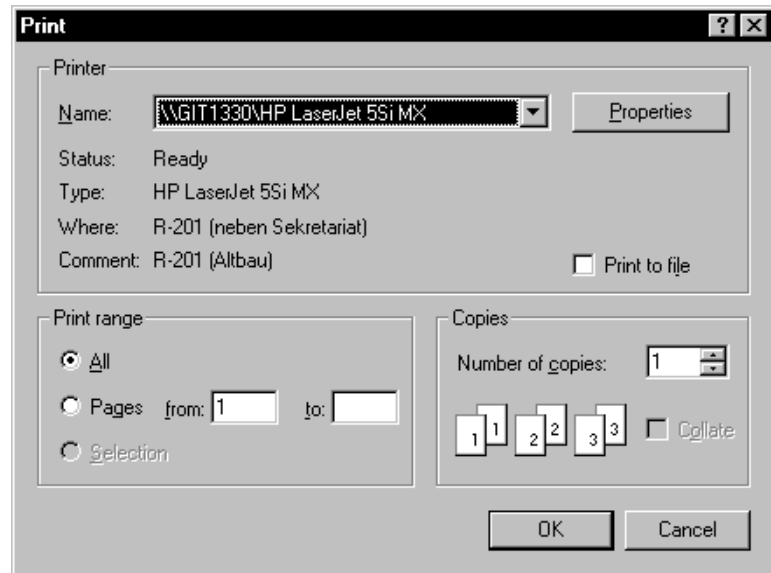


Figure 3-22. Print

- **Printer**

Select one of the current installed printers shown in the drop-down list box you want to use.

The static text shows status, type, and location of the selected printer.

You install printers and configure ports using the **Settings | Printers** command of Windows NT.

- **Properties**

Activate this button to inspect and change the properties of the selected printer.

See also Section 3.6.1.7, File | Print Setup for printer changes.

- **Print to File**

Select this check box if you want to store a print file instead of printing on the printer.

The **Print to File** dialog appears.

Here, specify the file.

• Print Range

Specify the pages you want to print:

Table 3-7. Print Range

Option	Description
All	Prints the entire document.
Page	Prints the range of pages you specify in the From and To boxes.
Selection	- (not selectable)

• Copies

Edit the number of copies you want to print for the defined page range.

• Collate

- (not selectable)

3.6.1.7 File | Print Setup

Shortcut: CTRL+N

Use this command to select a printer and a printer connection.

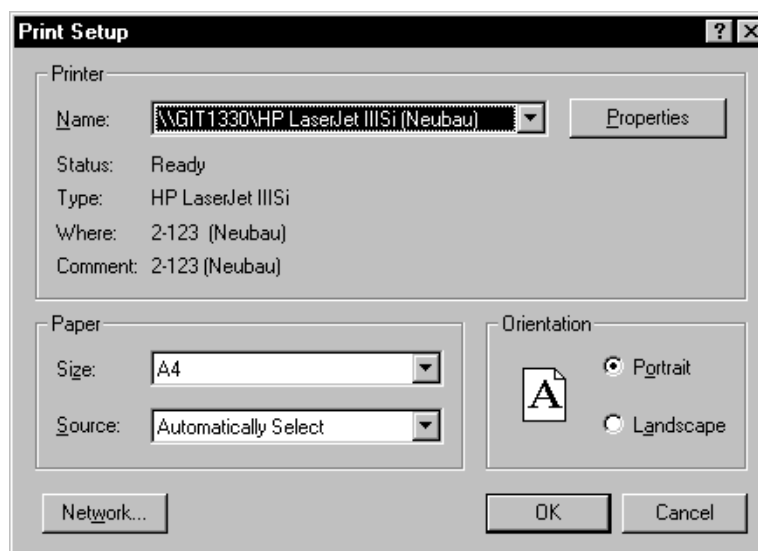


Figure 3-23. Print Setup

- **Printer**

Select one of the current installed printers shown in the drop-down list box you want to use.

The static text shows status, type, and location of the selected printer.

You install printers and configure ports using the **Settings | Printers** command of Windows NT.

- **Properties**

Activate this button to inspect and change the properties of the selected printer.

- **Paper Size and Source**

Select the size of paper that the report is to be printed on.

Some printers offer multiple trays for different paper sources. Specify the tray here.

- **Orientation**

Select **Portrait** or **Landscape**.

- **Network...**

Activate this button to connect to a printer at a network location.

3.6.1.8 **File | Exit**

Use this command to exit Bus Configuration Builder.

3.6.2 **Edit Menu**

3.6.2.1 **Edit | Create Bus**

Use this commands to create an additional AF 100 bus in the Bus Configuration Database.

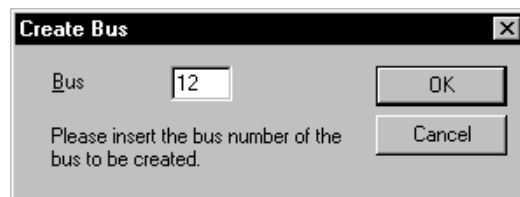


Figure 3-24. Create Bus

The Bus Configuration Builder adds the new bus to the structure in the left pane of the application window under “Busses”.

NOTES

Obviously, the Function Chart Builder did not encounter such a bus during target code generation—or BCD data generation as applicable—of any node of the project.

Typically, AF100 OPC stations are connected to such a bus. To create them use the **Edit | Create AF100 OPC Station** command.

3.6.2.2 **Edit | Create AF100 OPC Station**

Use this commands to create an AF100 OPC station on the selected bus.

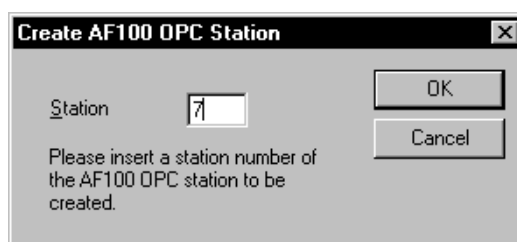


Figure 3-25. Create AF100 OPC Station

The Bus Configuration Builder adds the new station to the structure in the left pane of the application window under the selected bus.

NOTE

Configure AF100 OPC station by the **Edit | Properties** command.

3.6.2.3 **Edit | Delete**

Shortcut: DEL

Use this command to delete the currently selected bus, station, or node in the Bus Configuration Database.

3.6.2.4 **Edit | Copy**

Shortcut: CTRL+C

Use this command to copy selected parts of the text displayed in the right pane of the application window into the paste buffer of Windows NT.

3.6.2.5 Edit | Find

Shortcut: ALT+F3

Use this command to find a text pattern in the report displayed in the right pane of the application window.

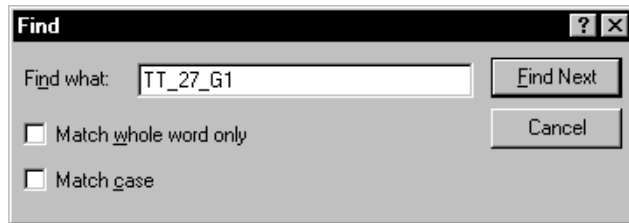


Figure 3-26. Find

- **Find What**

Type in the text box part the text pattern, which you want to find.

- **Match Whole Word Only**

Select this check box to search for the pattern as whole word.

Example: The pattern is **BUS** and you want to find **BUS 1**, **BUS 2**, and so on, but not **BUSSES**.

- **Match Case**

Select this check box to search for the pattern and take upper case/lower case into account.

Example: The pattern is **BUS** and you want to find **BUS1**, **BUS2**, and so on, but not **bus1**.

- **Find Next**

Activate this button to start or repeat searching.

If the text pattern has been found, the Bus Configuration Builder selects it.

NOTE

Select the right pane before using this command by clicking on it or by the **View | Next Pane** command.

3.6.2.6 **Edit | Properties**

Use this command either to inspect properties of the selected station or node.

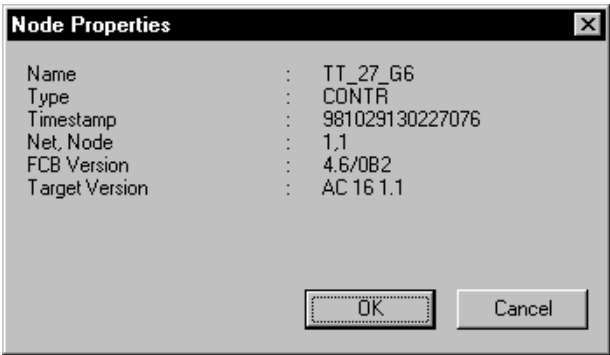


Figure 3-27. Node Properties

• **Properties**

See here the (read-only) properties of the selected station or node.
Or use this command to inspect and set properties of the selected AF100 OPC station.

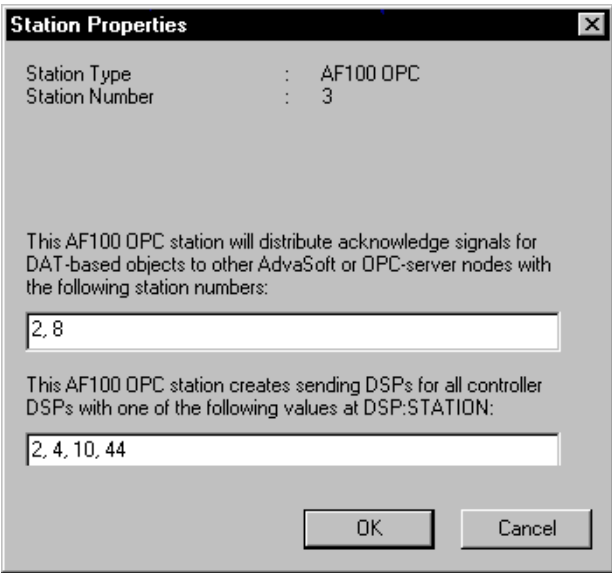


Figure 3-28. Station Properties

• **Properties**

See here the (read-only) properties of the selected station.

- **Acknowledge Signals Distributed to**

Define the receiving stations for the acknowledge signals distributed by the given AF100 OPC station for DAT-based objects.

Enter the station numbers of the corresponding AdvSoft or OPC server nodes separated by space ' ' and/or comma ','.

- **Receiving Stations**

Define the receiving stations for the sending DSPs of the given AF100 OPC station.

Enter the numbers of the corresponding stations separated by space ' ' and/or comma ','.

During different checks, the Bus Configuration Builder takes into account that the selected AF100 OPC station has sending DSPs for transfer on the given bus toward the specified stations.

3.6.3 View Menu

3.6.3.1 View | Refresh

Shortcut: F5

In case of Bus Configuration Builder (32-bit version, for AF100 OPC), use this command to refresh the structure tree in the left pane.

In case of Bus Configuration Builder for AdvSoft for Windows (version 3.11), use this command to refresh the structure window.

3.6.3.2 View | Next Pane

Shortcut: F6

The commands and keyboard entry refer to the selected pane of the application window. Initially the left pane is selected.

Use this command to move the selection from one pane to the next (other) one.

NOTE

Pane selection influences also the set of available commands in the menu and in the context menu (to be opened by right mouse click).

3.6.3.3 View | Split

Use this command to move the selection to the split bar between the panes of the application window, that is, to “seize” the split bar.

Then you can move it with the LEFT and RIGHT key.

NOTE

You can move the split bar any time by drag and drop with the mouse.

3.6.3.4 View | Expand All

Use this command to expand all branches of the structure tree of the Bus Configuration Database in the left pane of the application window.

NOTE

To expand a branch, click on its  symbols. Or select it and press the RIGHT key.

3.6.3.5 View | Collapse All

Use this command to collapse all branches of the structure tree of the Bus Configuration Database in the left pane of the application window.

NOTE

To collapse a branch, click on its  symbol. Or select it and press the LEFT key.

3.6.4 Action Menu

3.6.4.1 Action | Bus Load Calculation

Shortcut: CTRL+B

In case of Bus Configuration Builder (32-bit version, for AF100 OPC), use this command to calculate the bus load.

If you select a bus or an item under the bus in the right pane of the application window, the bus load will be calculated only for the selected bus.

Else the bus load will be calculated for all of the busses of the project.

The Bus Configuration Builder delivers the bus load in percent in the right pane of the application window.

NOTES

In case of receiving DataSets having no corresponding sending DataSets, the receiving DataSet—or the first one if there are several receiving DataSets with same BUS, STATION, IDENT values—is taken into account instead of the missing sending DataSet.

In case of AC 400 Series, S800 I/O is realized partly in the PC section. The PC part is not reflected in the Bus Configuration Database, hence not reflected in the calculated bus load.

See also Section 3.5.1.6, Bus Load Calculation and Example of Bus Load Calculation Report in Section 3.5.1.7, Examples of Reports.

In case of Bus Configuration Builder for AdvaSoft for Windows (version 3.11), use this command to calculate the bus load for the currently selected bus.

The Bus Configuration Builder delivers the result in a dialog box.

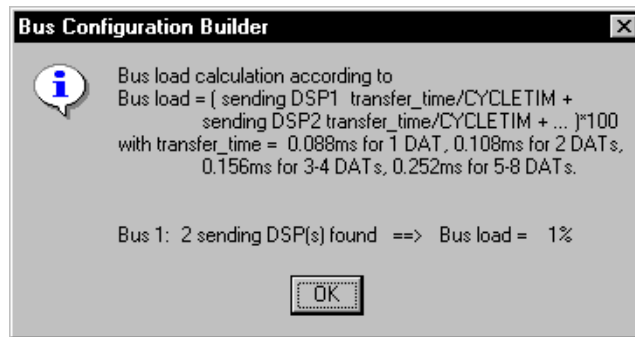


Figure 3-29. Bus Load Calculation, Example

3.6.4.2 Action | Check Database

Shortcut: CTRL+K

Use this command to check the Bus Configuration Database.

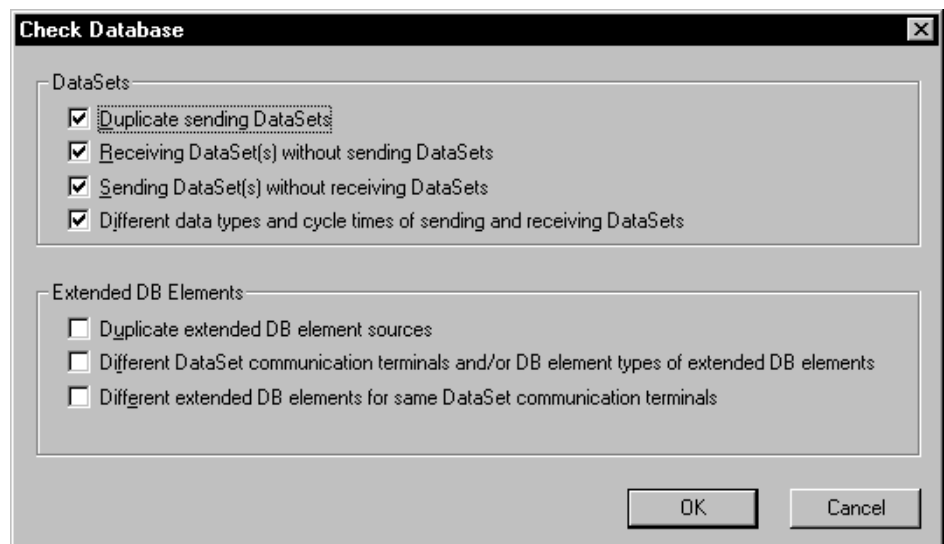


Figure 3-30. Check Database

If you have selected a bus in or an item under the bus the right pane of the application window, the checks will cover only the selected bus. Else the checks cover all of the busses of the project.

Select the appropriate options to define the checks to be executed.

• DataSets

Depending on the selected options, the Bus Configuration Builder checks

- Duplicate sending DataSets,
that is, whether there is a bus collision by two or more sending DataSets with the same BUS, STATION, IDENT value. Also AF100 OPC stations causing bus collision will be pointed out.
- Receiving DataSets without sending DataSets,
that is, whether sending DataSets are missing for receiving DataSets. Receiving DataSets of AF100 OPC stations are ignored.
- Sending DataSets without receiving DataSets,
that is, whether receiving DataSets are missing for sending DataSets.
- Data types of sending and receiving DataSet pairs,
that is, whether the values of corresponding REF terminals are identical for each DataSet pair with the same BUS, STATION, IDENT value. If the sending DataSet is missing, the first receiving DataSet is taken as reference.

Additionally, cycle times of sending and receiving DataSet pairs,
that is, whether the value of CYCLETIM terminal is identical for each DataSet pair with the same BUS, STATION, IDENT value. If the sending DataSet is missing, the first receiving DataSet is taken as reference.

NOTE

In case of AC 400 Series, S800 I/O is realized partly in the PC section.
The PC part is not reflected in the Bus Configuration Database, hence ignored
(not checked) by the Bus Configuration Builder.

• Extended DB Elements

Depending on the selected options, the Bus Configuration Builder checks

- Duplicate Extended DB element sources,
that is, if more than one signal (extended DB element) are defined as source for the selected bus. That means, the found extended DB elements have the same DB element name and the same value on their HW, PC, or MMI terminal.
- Different DataSet communication terminals and/or DB element types of extended DB elements
 - Different DataSet communication terminals, that is, if more than one signal (extended DB element) on the selected bus have the same DB element name and their DataSet communication terminals have different values. The checked communication terminals are the ones, which identify the DataSet address on the bus: DSP_BUS (bus), DSP_STAT (station), DSP_IDNT (ident), DSP_REF (reference number of the DAT in the DataSet element).
 - Different DB element types, that is, if more than one signal (extended DB element) on the selected bus have the same DB element name and different DB element types (callnames).

The first found Extended DB element with different DataSet communication terminals and/or DB element types to another Extended DB element is taken as reference.

- Different extended DB elements for same DataSet communication terminals, that is, if more than one signal (extended DB element) on the selected bus are defined with the same values for DataSet communication and if they have different DB element names. The checked communication terminals are the ones, which identify the DataSet address on the bus: DSP_BUS (bus), DSP_STAT (station), DSP_IDNT (ident), DSP_REF (reference number of the DAT in the DataSet element). Only extended DB elements with DataSet communication are checked (communication terminal DS_COM is set to SEND or RECEIVE).

The first found Extended DB element, which has the same values at the communication terminals, but not the same name to the other DB element, is taken as reference.

NOTES

The bus number of the extended DB element is visible at the DSP_BUS terminal in the communication section.

The DB element name is not case sensitive.

The subordinate DB elements MBS of the DB elements MB are only taken into account for the checks if their DB name differs from the item designation.

The sending and receiving DataSets, which are generated automatically by extended DB elements, are checked by the checks selectable in the **DataSets** group. The check "Different data types and cycle times of sending and receiving DataSets" detects also wrong reference number of the DAT in the DataSet element (terminal DSP_REF) of an extended DB element. (Sending and receiving DataSets on a bus must have the same DataSet length and type.)

Activate the **OK** button to start checking.

The Bus Configuration Builder delivers the result in the right pane of the application window.

See also Example of BCD Check Report in Section 3.5.1.7, Examples of Reports.

3.6.4.3 Action | Cross Reference of DataSets

Shortcut: CTRL+R

Use this command to report cross reference of DataSets in Bus Configuration Database.

If you select a bus or an item under the bus in the right pane of the application window, the cross references will cover only the selected bus.

Else the cross references cover all of the busses of the project.

NOTE

In case of AC 400 Series, S800 I/O is realized partly in the PC section. The PC part is not reflected in the Bus Configuration Database, hence ignored (not covered) by the Bus Configuration Builder.

The Bus Configuration Builder sorts all sending and receiving DataSets by their BUS, STATION, IDENT values and shows them in the right pane of the application window.

See also Example of Cross Reference Report in Section 3.5.1.7, Examples of Reports.

3.6.4.4 Action | Cross Reference of Extended DB Elements

Shortcut: CTRL+E

Use this command to report cross reference of extended DB elements in Bus Configuration Database.

If you select a bus or an item under the bus in the right pane of the application window, the cross references will cover only the selected bus.

Else the cross references cover all of the busses of the project.

The Bus Configuration Builder sorts all extended DB elements by their NAME, BUS, STATION, and IDENT values and shows them in the right pane of the application window.

See also Example of Cross Reference Report in Section 3.5.1.7, Examples of Reports.

3.6.4.5 Action | Dump Database

Use this command to dump the Bus Configuration Database.

If you select a bus or an item under the bus in the right pane of the application window, the dump will cover only the selected bus.

Else the dump covers the whole project.

NOTE

In case of AC 400 Series, S800 I/O is realized partly in the PC section.
The PC part is not reflected in the Bus Configuration Database, hence ignored (not covered) by the Bus Configuration Builder.

The Bus Configuration Builder dumps the BCD contents in hierarchical form

```
Bus
  Station
    Node
      DB Elements (in order PM, CI, DSP, EVS, ...)
        Terminals
```

in the right pane of the application window.

See also Example of BCD Dump Report in Section 3.5.1.7, Examples of Reports.

3.6.5 Help Menu

3.6.5.1 Help | Contents

Use this command to display the opening screen of Bus Configuration Builder Help.

The opening screen with **Contents** tab lists the available “how to”-type and reference information on the Bus Configuration Builder. The information is hierarchically ordered.

Click on the book symbols to open them and on help topic symbols to jump to final topics of interest. Click on underlined text to jump to more detailed or related topics.

In the **Bus Configuration Builder 2.* - Help** window you can click the **Contents** button whenever you want to return to the contents.

3.6.5.2 Help | Release Notes

Use this menu command to open the Bus Configuration Builder Release Notes containing the following:

- General information on the Bus Configuration Builder version, compatibility, and related documentation
- New functions, improvements, discontinued and replaced functions of the Bus Configuration Builder; fixed or known problems, restrictions, and recommendations
- Installation and un-installation of the Bus Configuration Builder version; upgrading, backup, and restoration of application data.

NOTE

The Release Notes is a *.PDF file. To read it, you need Acrobat Reader installed on your PC and the extension PDF associated with the Acrobat Reader. Acrobat Reader is a free product of Adobe Systems Inc.

3.6.5.3 Help | About BCB

Use this command to display the copyright and release notice of the Bus Configuration Builder.

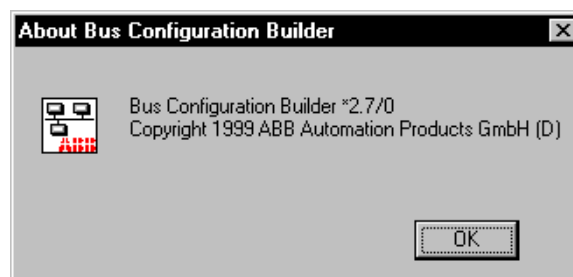


Figure 3-31. About Bus Configuration Builder

Chapter 4 Runtime Operation

4.1 Operating Overview

Not applicable.

4.2 Runtime Tutorial

Not applicable.

4.3 Operating Instructions

Not applicable.

4.4 Runtime Operation Menus

Not applicable.

Chapter 5 Maintenance

5.1 Error Messages

Not applicable.

Appendix A References

A.1 Directories and Files - BCB for AF100 OPC

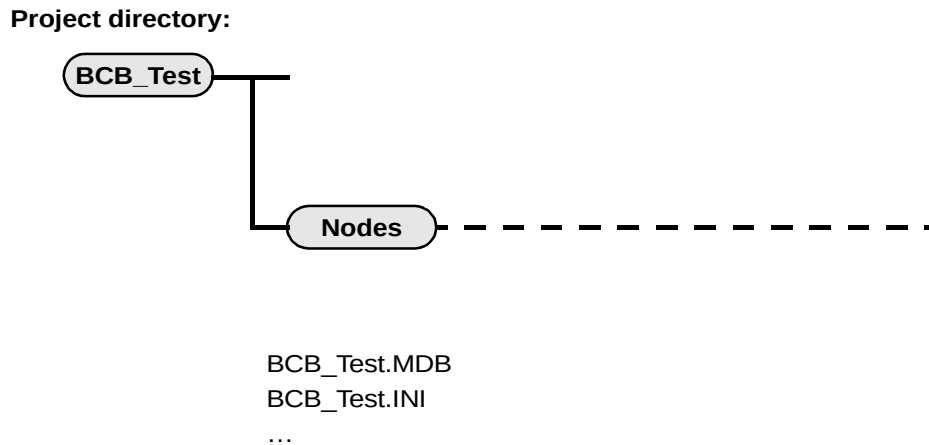


Figure A-1. Example of Directories and Files of BCB for AF100 OPC

A.1.1 Directories

The Bus Configuration Builder stores the communication data in the project directory.

A.1.2 Files

project.MDB

The Bus Configuration Database file *project.MDB* created by Bus Configuration Builder and filled by Function Chart Builder contains communication configuration data for the whole project.

project.INI

The *project.INI* file is created by the Application Builder. It contains general, non-BCB-specific data for the given project.

A.2 Directories and Files - BCB for AdvaSoft for Windows

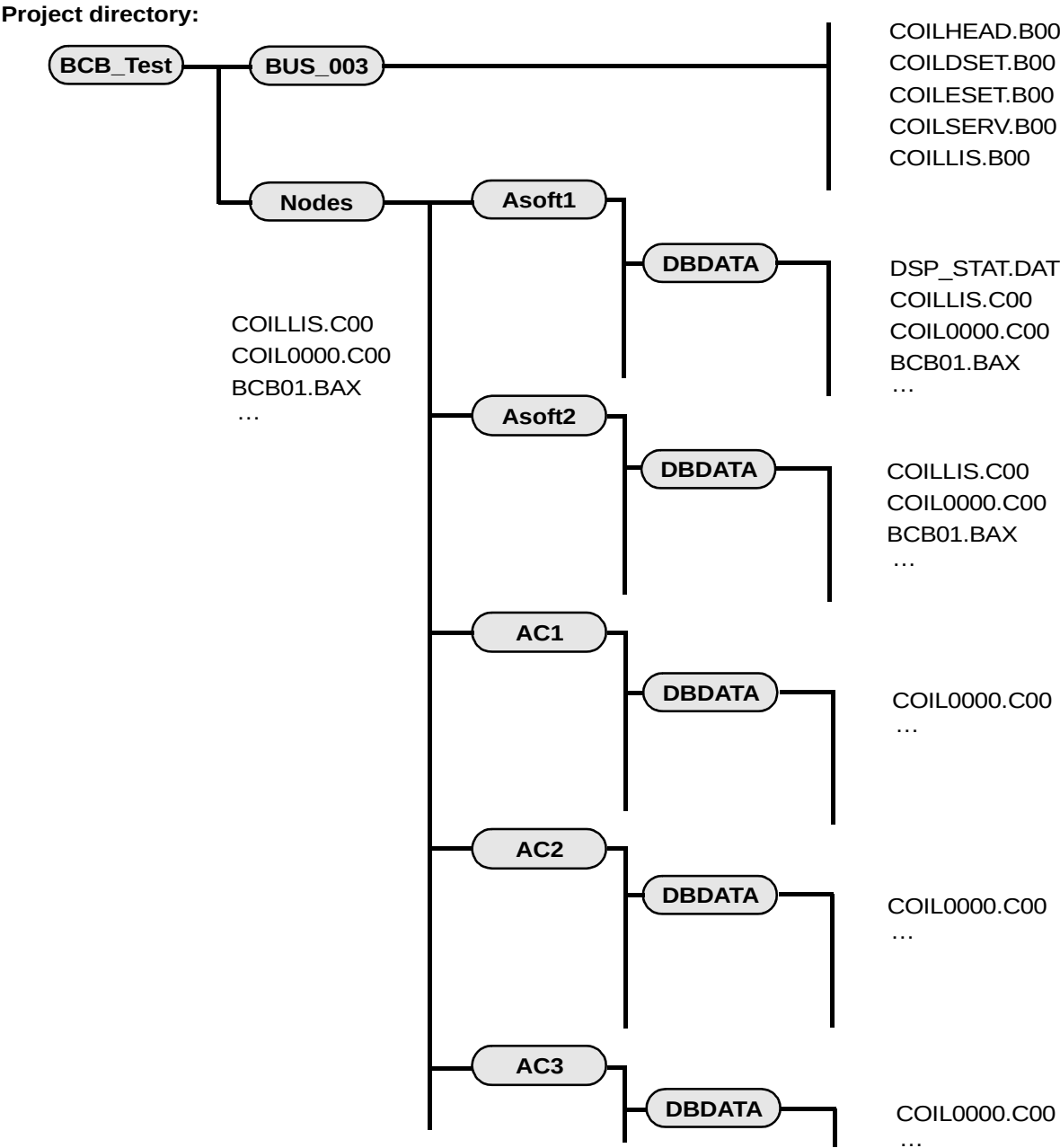


Figure A-2. Example of Directories and Files of BCB for AdvaSoft for Windows

A.2.1 Directories

The Bus Configuration Builder stores the communication data in two types of directories. These types are:

- The bus directory; it will be created by the Bus Configuration Builder for each Advant Fieldbus 100 selected in its start-up dialog. It is named, for example, BUS_001 or BUS_002.
- The node directory structure of each AdvaSoft node. You must create these with the Application Builder.

The directory structure is visualized in Figure A-3 with an example of the Windows File Manager.

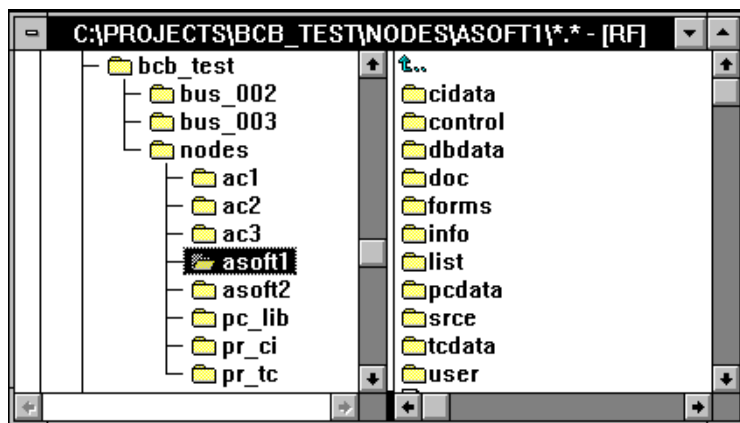


Figure A-3. Directory Structure of Project BCB_Test

A.2.2 Files

A.2.2.1 Files on Bus Directories

COILHEAD.B00

The file COILHEAD.B00 built by Bus Configuration Builder contains header information of all COIL0000.C00 of each Advant Controller 100 Series target.

COILDSET.B00

The file COILDSET.B00 built by Bus Configuration Builder contains the DataSet information of all COIL0000.C00 of each Advant Controller 100 Series target.

COILESET.B00

The file COILESET.B00 built by Bus Configuration Builder contains the Event Set information of all COIL0000.C00 of each Advant Controller 100 Series target.

COILSERV.B00

The file COILSERV.B00 built by Bus Configuration Builder contains the service data information of all COIL0000.C00 of each Advant Controller 100 Series target.

COILLIS.B00

The file COILLIS.B00 contains information, warning, error messages which are built during generation of COILHEAD.B00, COILDSET.B00, COILESET.B00 and COILSERV.B00 and the calculated bus load.

A.2.2.2 Files on Node Directories

COILvvvv.C00 (for AC 100 Nodes)

The file COILvvvv.C00 (vvvv = version range: 0 - FFFF hex) built by the Function Chart Builder's function **Generate Target Code** contains the **Configuration Object Information List (COIL)** of each Advant Controller 100 Series target. The version will be updated after on-line changes.

COIL0000.C00 (for AdvaSoft Nodes)

The file COIL0000.C00 contains the configuration data for AdvaSoft for Windows.

The Bus Configuration Builder generates a new COIL0000.C00 for every AdvaSoft node in its corresponding directory.

This file will be overwritten with the file generated by the menu command **File | Generate Target Code** of the Function Chart Builder.

BCB01.BAX

The file BCB01.BAX contains the configuration data for an AdvaSoft node in AMPL source code representation. The contents of all information lines that are inserted in the COIL0000.C00 of AdvaSoft nodes, are also inserted in BCB01.BAX in AMPL.

COILLIS.C00

The listing file COILLIS.C00 contains information, warning, error messages which are built during generation of COIL0000.C00 and BCB01.BAX for AdvaSoft nodes.

INDEX

Symbols

*.INI file A-1
*.MDB file 3-35, A-1

A

About BCB 3-51
AC 100 Series 1-5
AC 110 1-5, 3-5
AC 160 1-5, 3-5
AC 55 1-5
AC 70 1-5, 3-5
AC 80 1-5, 3-5
Action Menu 3-46
Advant Controller 100 Series 1-5
Advant Controller 110 3-25
Advant Fieldbus 100 3-25
Advant Station 100 Series Engineering Station 1-1, 1-6
AdvaSoft for Windows 3-3 to 3-5, 3-22, 3-30
AF 100 1-6
AF100 OPC 1-6, 3-5, 3-7
APB 1-6
Application Builder 1-6, 3-10, 3-19, 3-27 to 3-28, 3-31, 3-33
Application window 3-11, 3-28
AS160 OS 3-1

B

BCB application window 3-11, 3-28
BCB01.BAX file 3-27, 3-30, 3-32, 3-34, A-4
BCD 1-6, 3-8 to 3-9
 data for AC 400 Series nodes 3-20
BCD Check report 3-16
BCD Dump report 3-19
BCD-method 3-2
BCI 1-6, 3-8
BOIL*. file 3-3
BOIL-method 3-3
Bus 3-11, 3-29
 length 3-14
Bus Configuration Database 1-6, 3-2, 3-8 to 3-9
Bus Configuration Interface 1-6, 3-8
Bus Load Calculation 3-14, 3-33, 3-46
 report 3-15
BUS_nnn directory 3-31, A-3

C

Check Database 3-47
Check of Bus Configuration 3-21
Client 3-2

COIL interface 3-24
COIL*. file 3-4, 3-25, 3-31, 3-34, A-4
COIL0000.C00 file 3-31 to 3-32, A-4
COILDSET.B00 file 3-31, A-3
COILESET.B00 file 3-31, A-3
COILHEAD.B00 file 3-31, A-3
COILLIS.B00 file 3-31, A-4
COILLIS.C00 file 3-29, 3-31, A-4
COIL-method 3-4
COILSERV.B00 file 3-31, A-4
Collapse All 3-46
COM software interface specification 3-9
Commands 3-25
Communication
 data 3-25
 flow 3-9, 3-25
Compact Database 3-35
Configuration
 interfaces of AdvaSoft for Windows 3-23
 with BOIL Files 3-3
 with Bus Configuration Database 3-2
 with COIL Files 3-4
Configuration Methods 3-1
Configuration Object Information List 3-24
Configuration of AdvaSoft nodes 3-30
Contents 3-51
Context menu 3-13
Copy 3-42
Copyright 3-51
Create AF100 OPC Station 3-42
Create Bus 3-41
Cross Reference of DataSets 3-49
Cross Reference of Extended DB Elements 3-50
Cross Reference report 3-17 to 3-18

D

DAT_ elements 3-2, 3-5
Data subscription 3-25
DataSet size 3-14, 3-33
DataSets 3-22
DB 1-6
DBDATA subdirectory 3-32, 3-34
Delete 3-42
Delete Database 3-35
Dependencies 3-5
Directories A-2
Dump Database 3-50

E

Edit Menu 3-41
Environment of BCB 3-7, 3-22
Environment selection 3-10, 3-28
Events 3-25
Example
 of BCD Check report 3-16
 of BCD Dump report 3-19
 of Bus Load Calculation report 3-15
 of DataSet Cross Reference report 3-17
 of Extended DB Element Cross Reference report 3-18
Exit 3-41
Expand All 3-46
Export Data to AdvaSoft for Windows 3-34
Export Data to AF100 OPC 3-22
Extended DB elements 1-6, 3-2 to 3-3, 3-5, 3-18, 3-24, 3-50

F

FCB 1-6
File Menu 3-35
Files A-2
Find 3-43
FIX/DMACS 3-1
Function Chart Builder 1-6, 3-10, 3-19 to 3-20, 3-27, 3-30, 3-34
Functions
 for AdvaSoft for Windows 1-8, 3-30
 for AF100 OPC 1-7, 3-12, 3-14

H

Help Menu 3-51
HMI 1-6, 3-1, 3-8, 3-22
Human-Machine Interface 1-6

I

Increase maximum number of sending DataSets 3-32
Internal System Structure 3-8

M

Menu commands 3-35
Modification of BCD 3-20
Modification of Data 3-34
Multiple AF 100 support 3-5
Multiple CPU support 3-5

N

Navigation 3-12
New Configuration After On-line DB Change 3-34
New Database 3-35
Next Pane 3-45
Node 3-9, 3-11, 3-29

O

On-line DB change 3-34
Output window 3-28
Overview of Human-Machine Interface 3-1

P

Page Setup 3-37
Preconditions
 BCB for AdvaSoft for Windows 3-27
 BCB for AF100 OPC 3-10
Prepare Input for BCD 3-19
Prepare Input for Bus Configuration Builder 3-33
Print 3-38
Print Setup 3-40
Proceeding
 BCB for AdvaSoft for Windows 3-28
 BCB for AF100 OPC 3-11
Product Overview 1-7
Project 3-10 to 3-11, 3-19, 3-31
Properties 3-44

R

Refresh 3-45
Release Notes 3-51
Release notice 3-51
ReNUMBER item designation 3-32
Report 3-13, 3-15 to 3-19, 3-28

S

Save As 3-35
Select environment 3-10 to 3-11, 3-28
Series 1-6
Server 3-2
Split 3-45
Start-up 3-6, 3-11, 3-20, 3-28, 3-34
Station 3-11
Structure tree 3-11

T

Target code 3-10, 3-20, 3-27, 3-33
Transfer time 3-33

V

View Menu 3-45

W

Windows NT 3-10
Workflow 3-19, 3-33

X

XDB 1-6, 3-2 to 3-3, 3-5, 3-24



3BDS 100 312R201

November 1999